BRITISH MEDICAL JOURNAL

LONDON SATURDAY JULY 16 1960

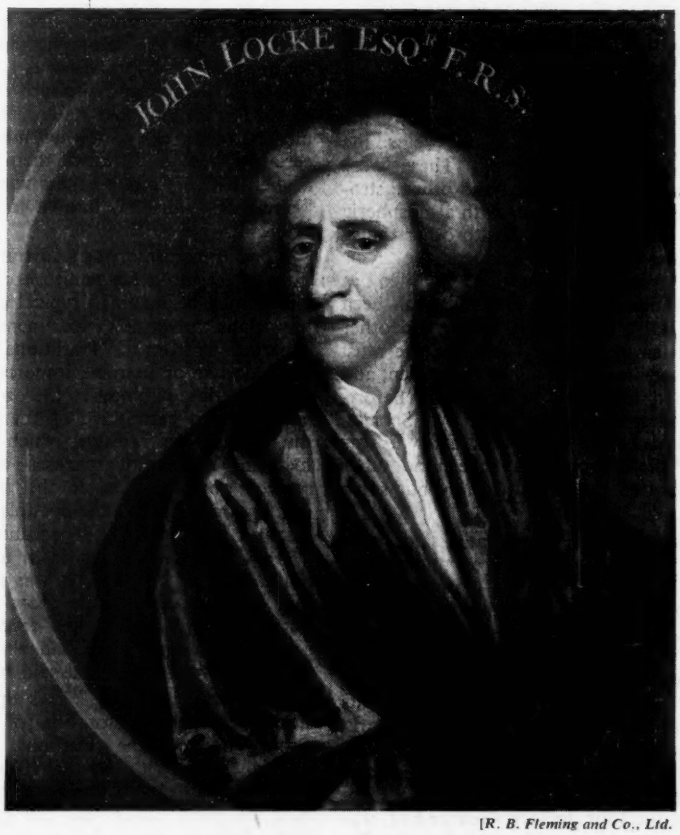
THE FOUNDATION OF THE ROYAL SOCIETY AND THE MEDICAL PROFESSION IN ENGLAND

BY

T. P. R. LASLETT, M.A.

Fellow of Trinity College, Cambridge, and University Lecturer in the Faculty of History

The foundation of the Royal Society in the year 1660 is perhaps the most important scientific event in the history of our country. We are celebrating the three-hundredth anniversary of the oldest scientific institution in the world, and the most distinguished. More than this, we are commemorating the institutional establishment of the experimental method in scientific inquiry, the beginnings of what we now call scientific medicine, along with the beginnings of systematic progress in every other branch of natural philosophy, as it then was called.



[*R. B. Fleming and Co., Ltd.*

We all know too much about the rate of progress in medicine and in everything else to suppose that all this happened overnight. Medicine, and especially the actual curing of sick people, is peculiarly difficult to bring under the experimental method, and until very recent times, indeed, advances in mathematics, physics, or even chemistry were exceedingly slow to affect the practice of doctors and the prospects of their patients. Indeed, the social historian has recently become a little sceptical about the importance of scientific medicine for a century and more after the foundation of the Royal Society. It was not until the chemical advances of the late eighteenth century, not perhaps even before the arrival of anaesthetics and antiseptics, that the welfare of the people as a whole was much affected. Nevertheless, the foundation of the Royal Society was to a surprising extent the work of the English medical profession. They helped to found it, and they supported it, these hard-working, far-sighted Stuart doctors, because they believed that it would save lives and relieve pain. It is not for us to be critical of them because it took so long.

They could not have founded it by themselves, of course, and we shall have to look rather carefully for the exact part which they played. We are right to choose the year 1960 for the anniversary, but the Society did not receive its charter or its Royal name until July, 1662. Moreover, it had a prehistory going back some fifteen years before 1660, both in London and in Oxford, a succession of philosophic meetings and of short-lived organized groups of scientific men. There is even a possibility that the idea of establishing a permanent institution was brought over from France, and foreign-born people were certainly influential in the early Royal Society. Dr. John Wallis, the great mathematician, an original Fellow, left behind him a record of these earlier meetings. It is from him that we can learn how prominent medical men had been in bringing the Society into being.

Medical Men Among the Pioneers

In London in "about the year 1645" he tells us there were weekly meetings of persons "inquisitive into Natural Philosophy, and other parts of Humane Learning, and particularly of what hath been called the *New Philosophy* or *Experimental Philosophy*." He gives us

the names of eight people who took part in these first recorded meetings of the inchoate Royal Society. Now four of them were medical doctors, all of them Fellows of the Royal College of Physicians, and one of them, Francis Glisson, was later President of that very important professional institution and an outstanding figure in seventeenth-century medicine. Wallis himself had studied medicine under Glisson and was said to be the first of his pupils to maintain publicly the circulation of the blood—for it has to be remembered that the great Harvey was still alive in 1645 and that his epochal discovery was not yet twenty years old. No wonder the young Robert Boyle could write in 1646 of this "new philosophical college, that values no knowledge, but as it hath a tendency to use," and was occupied with agriculture and engineering, as well as what we call science. Practical medical doctors have always been, and the practical bent of the early Royal Society must owe much to them. Knowledge, in Bacon's phrase, was for use in the relief of man's estate.

Wallis goes on to tell us the business of this group—"Physick, Anatomy"—and it is significant that these should begin the list, "Geometry, Astronomy, Navigation, Staticks, Magneticks, Chymicks, Mechanicks, and natural Experiments." The actual subjects of conversation were again headed by physiological ones, "the circulation of the blood, the valves in the veins, the *venae lacteae,* the lymphatick vessels." These were followed by the Copernican hypothesis and other astronomical topics, telescopes, experiments with atmospheric pressure and falling bodies, together "with other things appertaining to what hath been called the *New Philosophy,* which from the times of Galileo at Florence, and Sir Francis Bacon in England, hath been much cultivated in Italy, France, Germany, and other parts abroad as well as in England." Bacon, we must remember, was an ever-present reality to these men, and he had after all died less than twenty years before. Bishop Sprat, the earliest historian of the Royal Society, whose book appeared barely five years after it was founded, felt that "there should have been no other Preface to the *History* of the *Royal Society* but some of Bacon's writings."

Four of the eight pioneers, as already said, were London physicians, and two of them, as might have been added, one of the doctors and a mathematician, held posts in a London teaching foundation, Gresham College in the City. Peculiarly English as the Royal Society was to be, it is quite clear from Wallis's sentences that its founders were well aware that science was an international matter, and that Galileo's Italy, with its academies to help scientific as well as literary work, was in the 1640's much in advance of England. Indeed, Wallis gives credit to a foreigner, Theodore Haak, a German then resident in London, for suggesting these meetings, and one of the four doctors, George Ent, was a naturalized Dutchman. It would seem that the life of this club went on with fair regularity until the return of Charles II in 1660, though it was interrupted from time to time, owing, it is said, to the disturbed political condition of the country under Cromwell and the Commonwealth. The circle of members evidently grew, but the "Invisible College" in London was not the only club for this or for related purposes which had come into existence. Wallis shifts the scene to Oxford, after 1648–9—to Oxford where "some of our company" had taken residence.

Wallis himself went to take up a professorship; Jonathan Goddard, M.D., to become Warden of Merton College; and John Wilkins, who has often been looked upon as the personal founder of the final Royal Society, to become Warden of Wadham College. The philosophical society which came into existence at Wadham in the 1650's was evidently larger than the original London group, and it was much more distinguished. Besides the professors and heads of colleges, Robert Boyle was a member, and provided laboratory space and laboratory staff; so was William Petty, and so also two men still in their twenties. One was John Locke, and the other was another youth of miraculous ability and versatility, Christopher Wren.

A Striking Characteristic

These are great names in the history of our country, and they introduce us to the most striking characteristic of the founders of the Royal Society, that so many of them should have been men of genius. Christopher Wren in these early years was interested above all in anatomy and physiology, and his first notoriety came about because of accomplishments with blood transfusion. He never practised as a doctor, but Petty took the M.D. degree and probably did have patients. It seems fair to say that half of the Oxford circle were medical men. Six of the ten men mentioned by Wallis certainly were, and four of them practised at some time in their lives. Amongst them was Thomas Willis, whose "circle of Willis" is known to every dissector of the brain.

Blood transfusion was a favourite "experiment" with the early scientific academies, abroad as well as at home, and it may be taken as typical of the attitude of these physicians towards experimentation, and of their expectations from it. Traditional medicine looked upon the blood as of extreme importance in all disease, and on the letting of blood as the obvious first step towards cure. It was getting rid of the bad blood, the seat of the disease, an attitude which still survives in folk medicine and in the phrases we use. It must have seemed obvious, then, to the men of the seventeenth century that if it became possible to empty a sick man's veins of every drop of "peccant" blood, and give him a fresh supply, perhaps from animals, then he could not fail to be healthy. It was soon found, of course, that matters were a little more complicated than this, but the Royal Society had reported to it the case of a destitute wretch who had sheep's blood substituted for some of his own, and said he felt the better for it.

"The Royal Society," says Sprat, actually began in London at the Restoration of the Monarchy, after Cromwell and the Puritans, "in the wonderful, pacifick Year 1660. So that if any Conjectures of good fortune, from extraordinary *Nativities* hold true" (and here we must notice that the good Bishop, and most early Fellows were the same, still half believed in astrology) "we may presage all Happiness to the Undertaking. And I shall here join my solemn Wishes, that as it began in that Time, when our Country was freed from Confusion and Slavery; so it may, in its Progress, redeem the Minds of Men from Obscurity, Uncertainty and Bondage."

In 1657 Wren had gone to London as a professor at Gresham College, and there was an access to the London group of gentlemen of a scientific bent, even of noblemen. Once more three out of the nine new names,

mentioned this time by Sprat rather than Wallis, were physicians: one of them was Dr. Croone, whose Croonian lectures have ensured to anatomy and physiology an important place in the Royal Society for two hundred years and more. It was on November 28, 1660, that fourteen men, after hearing Mr. Wren's lecture at Gresham College, agreed to "continue their weekly meeting on Wednesday at 3 of the clock . . . everyone to pay down ten shillings, and besides engage to pay one shilling weekly, whether present or absent." These meetings have continued until to-day, and since 1663 they have been meetings of Fellows of the Royal Society, whose records start with the statement quoted. Nearly a fifth of the 115 original Fellows held the degree of M.D., and it has been reckoned by the Royal Society's most recent and authoritative historian that 55% of the scientists amongst them were physicians or surgeons: in 1698 the proportion was still about the same.

Traditional Categories

Sir Henry Lyons, late treasurer of the Royal Society, in distinguishing "Scientific Fellows" from "Non-Scientific" Fellows was following an established tradition in the study of the Royal Society in earlier times. The scientific Fellows are contrasted with the amateurs, the *virtuosi*, the country gentlemen and peers, interested in curiosities and rarities, diverted by "experiments," but not themselves engaged in adding to knowledge, not themselves professional scientists. Lyons reckoned that the non-scientists were more than twice the number of scientists in 1663, and thrice the number in 1671. Again following established convention, he attributed to this very high proportion, and especially to the prominence of amateurs on the Society's Council and amongst its Presidents, its rapid decline from its early, Newtonian eminence.

Although it is obvious that amateurs did hinder the early Royal Society, especially the politicians who became Presidents, the contemporary social historian finds himself a little critical of these traditional categories. They are not very helpful for such a purpose as describing the role of medical men, and we may notice that some very important people do not fit. John Evelyn, the diarist, a founding Fellow, was decidedly a gentleman and a virtuoso too, but he was a botanist and he was a theorist of scientific organization: he wrote in 1659 a sketch of a residential scientific college, which might have turned into something like the Institute for Advanced Study at Princeton. The Hon. Robert Boyle could never be called a mere amateur, but he was no full-time professional scientist: he was the son and brother of a peer, one of the richest in the country. In fact, there was in the 1660's only one professional full-time scientist in England, and that was Robert Hooke, the curator of the Royal Society for setting up experiments. Hooke happened to be a genius too, an architect as well as an astronomer, a physicist, a chemist, and a pioneer microbiologist of the first importance in the history of medicine. He was also the badly paid servant of the first voluntary society, a voluntary society for an intellectual purpose constructed on the model which is now universal, the first which ever existed.

A Fascinating Feature

Here we reach the feature of the Royal Society which makes it so fascinating to the student of social institutions, and when we recognize this fact about it we can begin to see how the medical men fit it. We can say that the Royal Society was brought into being and maintained by a peculiarly English alliance, an alliance between the gentry on the one hand, and certain of the higher clergy and of the university professors, together with a group of medical doctors, on the other hand. The scientists themselves, the great men like Newton, Boyle, Wren, Hooke, Halley of Halley's Comet—what an incredible generation it was—Petty and Graunt the founders of vital statistics, Ray the naturalist, Locke the philosopher, belonged indifferently to any one of these elements, and were not professionally distinct as a group.

Their work was made possible for them by the whole society, in which all were equals: opportunities for discussion, for foreign correspondence and scientific intelligence, for publication were all provided, though very little of what we should call laboratory space was ever made available, and almost nothing for subsidizing research. The largest distinct group, the most constant in attendance and certainly the most reliable source of subscriptions, which had to provide the revenue, were the medical men. They fitted best into the entirely novel atmosphere of a voluntary society for scientific purposes, although it was the "gentlemen, free and unconfined," as Sprat calls them, who brought with them the voluntary principle, making the Royal Society as independent as the House of Commons, which consisted of gentry. It may be inaccurate to classify the doctors as "scientists" as has always been done, and so create them into a majority of active Fellows, but it is legitimate to look upon them as the most reliable element in the new organization.

This is not the opportunity to go further into the analysis of a subject which, it must now be obvious, can become unexpectedly complicated. It may be asked why it was that a society of this sort appeared in England and nowhere else, for the practising physician was a familiar figure all over Europe, and the new experimental philosophy was also international. It must be baldly asserted in reply that the gentry were unique to England, the type of gentry who could make up the House of Commons and co-operate with clergymen, dons, and doctors in a voluntary society.

In fact, it should be added that our account is not complete, and one of our categories in a sense includes all the others. For in England pretty well everybody who helped to found this Society, or who became active in it, would be counted as a gentleman, and nearly all of them probably came of landowning families, even though, as in the case of Newton, Locke, or Pepys, the estate itself was often small. It is a mistake, and a common one, to think of the early scientists as mainly of business stock. There were exceptions, and one was Graunt, who was a London tradesman and had to be specially recommended to the Society by the King. Doctors in Stuart England were gentlemen, certainly the sort of doctor who would sit round the table and watch experiments under the presidency of Lord Brouncker and in a company which, by 1664, might include Prince Rupert, the King's uncle, or Lord Ashley, Chancellor of the Exchequer.

An Influential Model

Science in England, then, began its institutional life in a voluntary society of a sort which would have been inconceivable elsewhere: in these early years, moreover, it was more successful than it has ever been anywhere. These two facts are undoubtedly connected, though

obviously not as simple cause and effect. It would be wrong, however, to suppose that it was intentionally done. There had been a considerable amount of thinking on the subject of scientific institutions in the earlier seventeenth century, but none of it envisaged an entirely voluntary society. The most influential model was undoubtedly Bacon's House of Salomon, described in his *New Atlantis*, which was published in 1627. The institution here described is on an enormous scale, with vast ranges of laboratories, a whole hierarchy of scientists, even *Merchants of Light* as he calls them, who were to be for ever travelling about the world in search of scientific intelligence. The *House of Salomon* was to be a department of state. The earlier Italian academies were on a tiny scale, with only a handful of members, but they were under princely patronage and their members and publications were paid for by the potentate. The ambitious plans of the Czech thinker Comenius, and of Hartlib and others, who were all active and influential in England at the time when the group which Wallis describes first appeared, were all likewise public, governmental matters.

Undoubtedly the founders of the Royal Society expected that something like this would be done for them, that Charles II would provide not simply a lovely name and a handsome charter, but a building, endowments to pay professionals, a teaching establishment, not to mention funds for research and for staff. The royal charters themselves (there were three of them in rapid succession) even seem to contemplate this. In 1666 the French King founded, for a small group of men who had previously been organized as a club in somewhat the same way as the English groups we have described, the *Académie des Sciences*, which did pay salaries, subsidize research, ensure publication.

A Financial Problem

This was just what the struggling Royal Society needed, since from the very first its major problem, the perennial problem of the voluntary society, was to collect its subscriptions, pay its servants, keep itself going. By the year 1676 the Fellows owed their Royal Society £2,000 in back subscriptions, at a shilling a week a head. We may think it was as well that they never got anything out of Charles II except the derelict building which stood on the site of Chelsea Hospital, for we are told that French science suffered from the fact that it was official science, what the Crown, which paid the bills, thought science should be. Better that the wretched Hooke should be paid in copies of books published by the Royal Society, better that the generous Halley should be forced to foot the bill for Newton's *Principia*, although the Society had officially undertaken to print it.

We can now see how important the prosperous, methodical medical man must have been to the infant Royal Society. It is significant that when the desperate Treasurer had to start recommending Fellows to be expelled, only one of the original medical Fellows had to go ; the worst offenders were the country gentry. The doctors, if they provided none of the first-level genius, served faithfully on the Council and, like the munificent Boyle, must have provided in their homes those research facilities which the Society could never afford. We must guard against the impression that a Stuart doctor's house could be turned with great ease into a primitive laboratory because of its dispensary. It was the apothecaries who dispensed medicines, just as it was the barber surgeons who did the operating, and our subject would be a far different one if these were to be included as part of the medical profession. For it was from such humbler, " mechanical " people that the *operators* came, the laboratory assistants for men like Boyle and for the Society itself, and science could never have begun unless these men had been available, along with the clockmakers to fashion the instruments.

Leeuwenhoek and Malpighi were among the foreign members of the early Royal Society, and it published their articles in its transactions, even some of their books. It must not be imagined then that the doctors who gave so freely of their time and money received nothing back. It is remarkable, however, that so little opposition to the Royal Society's activities came from the medical profession. Even the coveted right to bodies of criminals for dissection, also possessed by the Royal College of Physicians, was conferred upon it.

Conclusion

It is true, and it is to be expected, that the ablest and most effective attacks on the new foundation did come from a doctor, a sustained polemic in defence of Aristotelian physics and chemistry, Hippocratic and Gallenic medicine against the experimental method and scientific medicine from " Henry Stubbe, physician at Warwick," in the 1670's. He was attacking Bishop Sprat and a famous scientific clergyman, Joseph Glanvill, an enthusiast for the experimental method, to whom the " traditional notional way " was incapable of providing a cure for a cut finger. And besides it " diverted Learned men from the study of God's GREAT BOOK, UNIVERSAL NATURE."

The tough and wily Stubbe worsted the facile Glanvill and declared in a letter to Boyle in June, 1670, that the body of the nation were against the Royal Society, the two universities (especially Cambridge), the physicians of London, for whom he claimed to be writing, indeed the whole medical profession, " except it be such as Dr. Sydenham." It so happens that the great Sydenham was never a Fellow of the Royal Society, although he and John Locke were friends and collaborators. Perhaps Sydenham was not alone in feeling that the experimental method, as knowledge then was, had not yet so much help to give the practising physician. But it is historically vitally important that Stubbe was wrong about his contemporaries, and that Sydenham was untypical of them. In the everyday support which it gave to the Royal Society, before and after its foundation, the English medical profession did more for the cause of science than it can ever hope to do again.

Perhaps it is unfair to talk as if none of the doctors belonged to that inner circle of genius which gave to the Royal Society its colossal historical reputation and importance. Dr. Raven believes that the whole scientific movement was begun and nurtured by the doctors. And one early Fellow of the Royal Society who was also a doctor, a practising physician, was decidedly a genius, John Locke the philosopher.

Locke, and he was not untypical, did not become a Fellow until he left the philosophical club at Oxford to go to London in 1668. In London he practised medicine, and wrought upon the body of his patron, that same Lord Ashley who was Chancellor of the Exchequer, a surgical miracle, which under those conditions might so easily have a surgical *quietus*. Here,

day after day, and year after year, in company with Sydenham, he made his observations, botanical, climatic, political, social, and statistical, as well as medical. And as a doctor, in this situation, he conceived of the great *Essay on Humane Under-standing*. When *Principia* was published, Locke was baffled by the mathematics. He had nothing to do with the Newtonian/mathematical development of the Royal Society. But as an early Fellow, Locke the doctor began the whole empirical movement of modern philosophy.

THE DEBT OF SCIENCE TO MEDICINE

BY

CHARLES E. RAVEN, D.D., D.Sc., F.B.A.

Christ's College, Cambridge

The foundation of the Royal Society 300 years ago represents not only a critical event in British history by the provision of an instrument whose influence brought this country in one generation from a position of insignificance to the forefront of the whole scientific movement, but a signal demonstration of the coming of age of modern man. Most historians will agree that our present epoch was inaugurated not at the Renaissance or by the Reformation, but in the seventeenth century, when the New Philosophy, expounded by Francis Bacon and evangelized by Comenius, integrated and explored the whole field of natural knowledge. Mr. Laslett's article in this issue expounds the particular value of its medical members to the origination and maintenance of the Royal Society. Here we will consider in more general terms the contribution of Medicine to the movement of thought and life of which the Society became the symbol and instrument in 1662.

The debt of our Western world to Greek medicine and in particular to the Hippocratic Colleges and the doctors' oath of service, and to the two pillars of medical learning—the anatomy and physiology of Galen and the botany and pharmacy of Dioscorides—has hardly yet been adequately acknowledged: the whole framework of our University education owes its origin principally to them. The Arabian doctors, trained on the works of Aristotle and bringing back to Spain and Europe the glory of Greek science, stimulated the scholastic movement of the thirteenth century. The invention of printing gave the world a flood of Greek and Latin classics, and provided scholars with the knowledge from which the whole field of nature could be surveyed. It took a century and a half to digest this knowledge, to compare it with the traditional lore of geographers and astronomers, of the herbals and bestiaries, of alchemists and magicians; but during that period it was in the medical profession even more than by the clergy and reformers that the new biology, cosmology, and philosophy were developed. We have only to remember the influence of Salerno upon Padua and the other great universities of Northern Italy, upon Montpellier and Basel, upon Louvain and Oxford, Leyden and Cambridge; the scholars like Ermolao Barbaro, Jean Ruel, and our own Edward Wotton, in 1541 President of the College of Physicians; and their successor Conrad Gesner of Zürich and his vast correspondence with doctors all over Europe from Lisbon to Dantzig, and from Naples to London, and with the two English physicians and scientists William Turner and John Caius, to see how direct and continuous was the service of the world of medicine to the expansion and the unifying of the studies of the organic world, of biology and physiology, and perhaps most effectively of botany. It is true to say that the study of plants, their taxonomy, their "uses and values," their employment as drugs, and their care and cultivation, had reached a true scientific status a generation before the influence of Copernicus had been felt even in the centres of learning. And practically all the contributors to this epoch-making achievement were medical men.

Gesner and the British Naturalists

Of them all Conrad Gesner is beyond question the outstanding leader. The orphaned son of a follower of Zwingli, he was bred up in the tradition of Erasmus and by the most enlightened leaders of the Reformation in Switzerland. Beginning with the classics, but early developing a passionate interest in nature, he studied the whole literature of science, composed the huge volumes on animals, reptiles, birds, and fishes, prepared for a similar treatise on insects, and had collected some thousand pictures and masses of notes of plants. Over eighty books were published by him before his early death, and his voluminous letters to dozens of doctors and naturalists gave unity and leadership to the scientific study of the flora and fauna, the cosmology and physiology of our world. Both our British naturalists were his personal friends: from Turner he received the first list of British fishes, and from Caius not only the book on dogs, but a long series of pictures drawn by Caius himself from the animals that he saw in the London docks and markets and in the Lion Gate of the Tower, which was at that time our only zoological gardens. Among these pictures was an excellent drawing of a female elk which Caius described by the name of horse-deer, because, as he explained, though the Norwegian sailors who had imported the animal called it an elk, Julius Caesar had stated that the true elk had no joints in its legs, "therefore this cannot be an elk." Gesner's reply, while grateful and gracious, states plainly "though Caesar says this about the elk just as Herodotus says it of the elephant, both statements are false: there is no animal without jointed legs."

This is a good illustration of the principal problem of these early investigations; how were they to deal with the vast mass of lore and fable which for a thousand years had done duty as natural history? Not only unicorns and gryphons, the yale and the phoenix, but lions and cranes, the fox and the crow, were the heroes of a library of legends and anecdotes, and familiar through centuries of sermons and moralizings. We can see from a comparison (say) of Shakespeare with Milton how the old world of Caliban and Ariel, of fairies and witches, gave place to the realm of law and observation, of *Areopagitica* and the classics: but for the men of the sixteenth and early seventeenth centuries the change demanded a discipline not only of literary criticism, but of observation and experiment quite strange to the tradition of culture and religion. When we add that even the classical authorities—even Aristotle and Theophrastus—were describing only the beasts and plants of the Eastern Mediterranean, we can realize something of the difficulties which Turner, when he wrote the first list of birds or tried to identify the flora of the Northumberland coast or the East Anglian fens, had to overcome. Only an intense scrutiny of the classical

descriptions and a close co-operation with colleagues in other countries made the task practicable. If it had not been for the excellence of the artists who illustrated the herbals of Brunfels and Fuchs, and the diligence and zeal of the great publishing houses like those of Isingrin, at Basel, or Christophe Plantin, at Antwerp, the naming and classifying of plants could never have been accomplished so quickly. When we realize the scientific merits of the Bauhins and the skill and speed with which gardeners produced the pinks and tulips of the Dutch gardens, or of our own John Parkinson's *Paradisus,* we shall realize that the new age had stimulated a vitality equal to its challenge.

Medicine's Special Contribution

The special contribution of medicine in the early days of science was due to two chief causes.

In the first place the doctor's profession is concerned not with things but with people. He checks his results by their effects upon his patients, and is thus aware of human nature in its wholeness and can avoid the error both of the scientists, who are liable to treat persons as machines, and of the theologians, who regard them as fallen angels. Medicine must in its very nature adopt a psychosomatic philosophy; and in fact if we study its history we shall find that it has constantly maintained an estimate of mankind that mediates between the two extremes: from Hippocrates to Sir Russell Brain it is dealing with a creature in whom body and mind are united.

In the second place medicine has always been international in outlook and contacts; 300 years ago the doctors had for a century been men familiar with most of Western Europe. A brief survey of the outstanding medical scientists will show their breadth of experience. William Turner and John Caius had both taken medical degrees in Italy. Turner as a friend of Latimer and Ridley had left England when Henry VIII persecuted the Reformers, and went to Ferrara and Bologna, working with Brasavola and with Luca Ghini in botanic garden and herbarium, and afterwards meeting Gesner and spending some years in Germany and Friesland. He published his bird-book at Cologne, and before his return to England had visited Antwerp. Caius stayed some time at Padua and actually shared lodgings with Vesalius. He also met Gesner and kept up a close contact with him. When Turner was physician to the Duke of Somerset he introduced the growing of lucerne into England. Caius, though conservative in temper and religion, contributed the first clinical study of sweating sickness to his colleagues at home and overseas. Their follower Thomas Penny, a close friend of Peter Turner, William's doctor son, also travelled extensively, was visiting Gesner at the time of his death, and brought back to England his material for the study of insects. Practising in London, Penny was in touch not only with a large number of English doctors and naturalists but with the great botanists of the Continent, De l'Ecluse and the brothers Bauhin. His friend and colleague Thomas Moffett took over his work on insects and prepared it for publication in 1589, being himself interested both in entomology and in dietetics. The book, *Theatrum Insectorum,* was in fact the first full account of its subject to be written, though it was probably not published until long after Moffett's death, and then by Sir Theodore de Mayerne in 1634. Moffett, who had himself studied under Felix Platter at Basel and travelled in Italy and Spain, was a man socially attractive and mentally versatile, but though a champion of Paracelsus and a writer on medical subjects, he was hardly a scientist, and certainly made a poor job of his editing of Penny's work. Nevertheless, the *Theatrum* shows how numerous and widespread were the doctors interested in biology; for in addition to the many botanists reference is freely made to notes on insects supplied by John James, physician to Queen Elizabeth, Timothy Bright, of St. Bartholomew's, Edward Elmer, a surgeon working in Russia, to the painter and explorer, John White, and to the very learned Norfolk squires, Thomas and Edmund Knyvet. Clearly, if the first years of the seventeenth century did not produce any medicals of the scientific eminence of Turner, Caius, and Penny, their numbers and influence made up for this: they were, it appears, more absorbed in their own profession.

Harvey, Merrett, and the Invisible College

In the next generation came the greatest of all medical scientists, William Harvey, whose discovery of the circulation of the blood, recently vindicated by Louis Chauvois, must not obscure the fact of his very wide and interesting work in the whole field of natural science. It is indeed one of the tragedies of the Civil War that his collections and notes were destroyed in London while he was attending King Charles at Oxford. But his *De Generatione* contains a mass of information not only about his observations on the formation of the chick in the egg and the growth of the foetus in the deer, which he obtained from the royal herd, but about animal and bird courtship and behaviour. Harvey, who had taken his medical degree at Padua in 1602 and had lectured for many years at the College of Physicians, published his *De Motu Cordis* at Frankfurt in 1628, travelled with the Earl of Arundel in Germany and Austria, visited the Bass Rock, and in spite of his loss left much varied material to his pupil and friend Christopher Merrett, a doctor practising in London, who took charge of the College of Physicians' house and museum, and who was elected an original member of the Royal Society in 1662. Having attended for some years the so-called Invisible College with Jonathan Goddard, Professor of Physic at Gresham's College, George Ent, Francis Glisson, John Wallis, William Petty, and John Wilkins, Merrett was commissioned to produce a full list of the fauna, flora, and fossils of Britain, a task eminently appropriate to the first efforts of the Royal Society. He set to work with energy, enlisting the help of friends, employing an old soldier, Thomas Willisel, who proved to be an excellent collector of plants and other specimens, and condensing all the literature relevant to his task. Unfortunately he was not a real naturalist or scholar, had done no first-hand work, and was often very unintelligent in his use of authorities. Nothing could be worse, for example, than his treatment of the butterflies which he copied from Moffett, but so crudely that in his version no single species can be correctly identified. John Ray could only refer to the result as "Merrett's bungling *Pinax*." It is, however, to his credit that he insisted that the fossil plants and animals were genuine creatures which "had communicated their shape to the soft earth," and quoted the fishes from Eisleben to which Gesner had drawn attention a century before.

Apart from these older men, we know from the correspondence of John Ray, as well as from its *Proceedings,* that the Royal Society elected a number of younger doctors into its Fellowship soon after its

foundation. Walter Needham, the embryologist, of Queens' College, and Thomas Allen, of Trinity and Caius, were both friends of Ray at Cambridge; both practised in London and were elected to the Royal Society in the same year as Ray, 1667. Martin Lister, the conchologist, of St. John's, whom he met at Montpellier, who became an F.R.S. in 1671 and moved to London in 1684; Tancred Robinson, Ray's closest friend, whom he met through Lister, and who travelled extensively but also settled in London, and was elected in 1684; and Hans Sloane, also a close and most devoted friend and for long the mainstay and President of the Royal Society, were the three most valued and influential of his medical colleagues and helpers. It was largely by their influence that the Society published Willoughby's book on fishes, of which Ray was the actual author, and the huge volumes of his *History of Plants*, and indeed in the very difficult period in the last two decades of the century it was their enthusiastic service which saved it from possible extinction.

Along with those thus mentioned there were a number of others, surgeons and apothecaries as well as physicians, who supported and served the Society either as Fellows, or, like Thomas Sydenham, by advice and encouragement from outside. Thanks to them, anatomy and physiology, not less than biology, advanced rapidly and to a point at which further progress had to wait until physics and chemistry had reached a scientific status—until, that is, the doctrine of the four elements had been at last abandoned and chemistry had been emancipated from magic and astrology and the myths of the alchemists. If during the next two centuries *Homo faber* almost replaced *Homo sapiens*, and the machine became the symbol and instrument of human excellence, that is merely the price that has had to be paid for the accomplishment of the revolution that is now reaching its climax. As a complete and coherent interpretation of the nature of the universe becomes more attainable—and the travail of its birth is now upon us—we shall be able to appreciate more truly the stages of our history and the significance of the various contributions that have developed its progress. *Eppur si muove*: Galileo may never have uttered those words, but the more we know of evolution the more widely are they verifiable. In the later phases of the process our debt to the medical profession will become more evident.

And if many will protest and be tempted to echo the confession of Claude Bernard, greatest of physiologists, "The science of medicine of which I am supposed to lecture does not yet exist"—this is proof rather of the magnitude of the changes to be made than of the incompetence of the workers. Before we condemn the doctors for their failure to abandon the traditional beliefs and practices of their profession—for their use of intolerable medicines, their observance of folklore and superstition, their slowness in rejecting witchcraft, and crude teleology—we may perhaps admit that all other callings including the more abstract sciences have displayed similar weaknesses and that wisdom after the event, while it flatters our vanity, too often encourages us to ignore the extent to which we ourselves are obsessed by ideas and guilty of conduct which are in our moments of enlightenment seen to be absurd.

THE ROYAL SOCIETY AND ITS MEDICAL PRESIDENTS

BY

Sir ARTHUR MacNALTY, K.C.B., M.A., D.M., F.R.C.P., F.R.C.S.

Fellow of University College, London

Medicine is a science as well as an art, and when the seventeenth century came—the "Insurgent Century," as Professor Singer termed it—its leading exponents were quick to seize the new learning, born of the Renaissance, and to apply its lessons to the study and treatment of disease. The august authority of the schoolmen based on their teaching of Galen and Aristotle was questioned, and Copernicus had enunciated a new theory of the universe.

"The Invisible College"

Earlier scientists had already paved the way for these inquiring minds. Vesalius gave a new anatomy; William Turner, M.D., had founded English botany; William Gilbert, M.D., had discovered magnetism and described electricity; while William Harvey discovered the circulation of the blood and was a pioneer in embryology. Amid the clash of civil war thoughtful and intelligent Englishmen perceived that in the natural world around them there were laws and phenomena, wonders and marvels that cried out for investigation. Gilbert, Francis Bacon, Abraham Cowley, and Sir William Petty had all proposed schemes for the co-ordinated study of natural philosophy; while the virtuosi, the amateurs of science, the collectors of curiosities, coins, and rarities, sought knowledge from the scientists. Out of this alliance came the "Invisible College," said to be Robert Boyle's term for the beginnings of the Royal Society, which met weekly in London from 1645, sometimes at Dr. Goddard's lodgings, sometimes at a tavern, and thereafter at Gresham College. Of its ten members, all comparatively young, five were physicians—namely, Goddard, Ent, Glisson, Scarburgh, and Merrett. By the close of the Civil War the group were dispersed. Boyle and Dr. John Wilkins, afterwards Bishop of Chester, came to Oxford, where meetings combined with the Oxford Philosophical Society, founded in 1651, were held in Wilkins's rooms at Wadham College. Other members of the "Invisible College" remained in or near London. By 1657 the meetings had been resumed at Gresham College.

Founding of the Royal Society

On November 28, 1660, after listening to a lecture by Wren at Gresham College, the members of the "Invisible College," of whom John Evelyn and Sir Robert Moray were active leaders, planned to found "a Colledge for the Promoting of Physico-Mathematicall Experimentall Learning." King Charles II, who studied anatomy and chemistry as a hobby,* approved the

*Pepys records in 1663 that Mr. Pierce, the surgeon, and Dr. Clarke "did dissect two bodies, a man and a woman, before the King, with which the King was highly pleased."

design, and, on December 12, agreed to appoint a president and a treasurer. A register was to be kept in three books—one for the statutes and names of the Society, one for experiments and notes of discussions, the third for occasional orders. Evelyn gave the body its name of the Royal Society. In September, 1661, the King granted his approval of the Society's incorporation by Charter "to the President, Council and Fellows of the Royal Society of London for Improving Natural Knowledge." This passed the Great Seal on July 15, 1662. In 1663 a Second Charter was granted, together with a coat of arms with the motto *Nullius in verba*, indicative of the Society's determination to withstand the domination of authority and to test all statements by carefully verified facts. The King declared himself Founder and Patron of the Society and presented it with a silver-gilt mace.

James, Duke of York, and Prince Rupert of the Rhine were early Fellows of the Society, and after the King's signature signed their names in the Charter Book in October, 1664. The Duke, having succeeded his brother as King James II, was Patron of the Royal Society, with Pepys as president, when Newton's *Principia* was published in 1687. James does not appear to have been active in the affairs of the Society, although Dr. McKie has shown in an interesting paper on the ex-king's visit to the Paris Observatory in 1690 that he was no mean amateur of science and versed in navigation.† Prince Rupert spent his last ten years in chemical, physical, and mechanical researches. He improved the processes of mezzotint, and described these to the Royal Society in 1662; he also invented a new form of gunpowder, "Prince Rupert's drop," a detonating glass bulb, and "Prince's metal," an alloy of copper and zinc. The first President of the Royal Society was William, Viscount Brouncker, mathematician and courtier. Dr. Wilkins and Henry Oldenburg were the two first secretaries. The Society received no State grant, and admission fees and subscriptions often fell into arrears.

Homes of the Society

The Royal Society met first at Gresham College. After the Great Fire of London the buildings were required for the Lord Mayor and the merchants. Through the kindness of the Duke of Norfolk temporary accommodation was found for the Society in Arundel House. By 1673 meetings had been resumed at Gresham College. In 1669 Charles II gave the Society the Chelsea College lands as a site for a building, but took them back in 1682 for the Royal Hospital on promise of £1,300 as compensation, which was never paid. As the Mercers Company wanted the rooms at Gresham College, the Society, in 1710, bought a house in Crane Court. This home of their own they occupied for seventy years. In 1780 they moved to more capacious accommodation in Somerset House, given by the Government. After the great Exhibition of 1851 the Prince Consort suggested that its profits should be used to buy undeveloped land at South Kensington and a centre established for the London scientific societies. They preferred to be more in the middle of London; and, in 1853, the Royal Society moved with the Chemical, Linnean, and other societies to Burlington House, Piccadilly. In 1873 the Society became settled in a wing of Burlington House, its present home.

†McKie, D. (1958). "James, Duke of York, F.R.S.," *Notes and Records of the Royal Society of London*, **13**, No. 1. June, 5–18.

The Philosophical Transactions

Oldenburg edited the *Philosophical Transactions*, which first appeared in March, 1665. He conducted an extensive correspondence with Spinoza, Bayle, Leibniz, and other foreign savants. After his death in 1677 the *Transactions* were continued through 46 volumes under the secretaries' private editorship. From 1679 to 1682, under Robert Hooke's editorship, the journal was called the *Philosophical Collections*, but reverted to its original title in 1683. In 1687 publication was suspended until revived under Sir Hans Sloane's secretaryship in 1691. It was not until 1752 that the *Transactions* were taken over by the Society and published by the Committee on Papers.

Attacks on the Society

In spite of royal patronage, there was some early opposition to the Royal Society. Robert Hooke's and Wren's researches into minute living objects with the first compound microscopes were ridiculed by Dr. South, the public orator of Oxford University, who said the fellows "can admire nothing but fleas, lice and themselves." Thomas Sprat in defence wrote his *History of the Royal Society* in 1677. The attacks continued. The wise men of science were confused with the virtuosi who were Fellows. The Society as a whole was satirized by Samuel Butler in his poems, "Elephant in the Moon," and "On the Royal Society"; by Thomas Shadwell in his play, "The Virtuoso," with its famous character, Sir Nicholas Gimcrack; and by Mrs. Aphra Behn in her farce, "The Emperor in the Moon."

The Struggle for Survival

By 1680 the scientific Fellows held it important that one of them should be elected to the presidency. Robert Boyle was the first and natural choice. He refused because he was unwilling to take the required oaths on election. They then elected Sir Christopher Wren, M.D., "as an eminent man of science." He improved the standing of the Society, but could only hold office for two years. His successors were Sir John Hoskins, a lawyer, Wyche, Samuel Pepys, the Earl of Carbery, described by Lord Clarendon as "a person of as ill a face as fame, his looks and manner both extreme bad," and the Earl of Pembroke—who, in his one year of office, never attended a meeting. Under Carbery and Pembroke the Society's fortunes declined, its finances were scanty, its membership diminished, and doubt was expressed whether it could survive.

Nevertheless, scientific work progressed. Collections of specimens in natural science were made by Nehemiah Grew, M.D., F.R.C.P., and others, and catalogued. On Evelyn's advice a library was begun. Problems propounded by Charles II and Government were studied and solved. Newton's *Principia* was published through Halley's generosity, and scientific apparatus was given by the Society to the Royal Observatory at Greenwich after the King had appointed John Flamsteed, F.R.S., the first Astronomer Royal in 1675. Donations and legacies were received from Dr. Wilkins and other Fellows.

Recovery of Prestige

Although Addison, Steele, Pope, as well as Swift in *Gulliver's Travels*, satirized the Society, its prestige was consolidated under Sir Isaac Newton, perhaps its

greatest president, who held office from 1702 until his death in 1727. The majority of the Fellows were still amateurs of science. They were the patrons of the Society, supplied it with funds, and helped it to survive. Sir Hans Sloane's reforms and able administration as secretary and as president from 1727 to 1741 augmented the influence, financial position, and membership of the Royal Society. Medical discoveries continued to be made and reported to the Society. The Rev. Stephen Hales made important experiments in animal and vegetable physiology—blood-pressure, the rise of sap in plants. He applied science to hygiene, ventilation, the purification of water, and the preservation of food. The Society promoted inoculation against smallpox. Dr. James Lind in 1753 showed by his treatise on scurvy the importance of fresh fruit and vegetables in long sea voyages. There was a general impetus towards scientific experiments and researches, in which medical scientists shared.

Huxham, of Totnes, studied typhoid, typhus, and diphtheria; Richard Mead, plague; the illustrious Heberden, diphtheria, angina, chickenpox, smallpox, night-blindness, and epidemical colds; Fothergill, epidemic sore throat; Haygarth, of Chester, smallpox, typhus, and rheumatic fever; Willis, epidemic diphtheria, typhoid, and puerperal fever; and Withering, of Shropshire, scarlet fever, heart disease, and tuberculosis. Edward Jenner, F.R.S., the pupil of John Hunter, F.R.S., opened the door to immunology by his experimental work on vaccination for smallpox.

Distinguished men from oversea and abroad were elected Fellows. Among these was Benjamin Franklin, elected in 1756 "for his curious experiments and observations on electricity," which had already secured him the Copley medal. Great discoveries were made in chemistry by Joseph Priestley, Cavendish, Lavoisier, and others. Sir William Herschel added to astronomical knowledge. The Society fostered exploring expeditions to the South Seas, the Antarctic, and the Arctic, and aided the growth of the colonial empire.

The Copley Medal

The Copley medal, the highest award of the Royal Society, was founded in 1736. Its medallists, now numbering over 200, form a roll of illustrious names in science, not limited to British nationality and including a number of medical scientists such as Hunter, Huxley, Lister, Pavlov, Sherrington, Hopkins, Dale, and Adrian.

Sir Joseph Banks

In 1778 Joseph Banks (1744–1820), botanist, at the early age of 34 was elected President, and held office for nearly 42 years. A wealthy man, he had made considerable collections of flora and fauna at his own expense in Newfoundland and the South Seas, where he accompanied Captain Cook in his first expedition. He developed and enriched the Royal Gardens at Kew; and was in favour with George III, who made him a baronet in 1781. Banks was a good administrator, hospitably entertained the Fellows and eminent men of science from abroad, and elevated the status, dignity, and influence of the Society. He helped to found the Linnean Society in 1788 and the Royal Institution in 1800, which numbers many Fellows of the Royal Society among its members, and maintains close relations with it. Distinguished scientists continued to serve the Society during Sir Joseph's presidency, including medical ones like Wollaston and Thomas Young, M.D., F.R.C.P. (1773–1829), whose professorial lectures at the Royal Institution established the undulatory theory of light. He also investigated haemodynamics, colour vision, and Egyptian hieroglyphics. Dr. Wollaston's brief presidency as successor to Banks strengthened the scientific membership of the society.

Sir Humphry Davy

Humphry Davy (1778–1829), chemist, was the son of a wood-carver at Penzance. He might almost rank as a medical president of the Society, for in 1795 he was apprenticed to a Penzance surgeon, and subsequently was assistant to Thomas Beddoes, M.D. Oxon., who, at Bristol, in 1798 established a Pneumatic Institute for the cure of diseases by inhalation of gases. Here Davy discovered the anaesthetic properties of nitrous oxide. This led to his appointment as lecturer at the Royal Institution and election as F.R.S. in 1803. His researches in agricultural chemistry; the discovery of potassium, sodium, barium, strontium, calcium, and magnesium; the investigation of chemical compounds united to oxygen; and of fire-damp, which led to the invention of the safety lamp, were his main achievements. In 1812 he was knighted, in 1818 was created a baronet, and from 1820 to 1827 was President of the Royal Society. He was also a poet and an angler.

Reform of the Society

Since 1772 the presidents had been eminent scientists, but from 1827 to 1858, with the exception of the Earl of Rosse (1848–54), an astronomer, the amateurs of science again held sway. They comprise Davies Gilbert, M.P. (1827–30), a former treasurer and an amateur physicist; H.R.H. the Duke of Sussex (1830–8); the Marquis of Northampton (1838–48), antiquarian and geologist; and the Earl of Wrottesley (1854–8), an amateur astronomer. All these presidents were men of distinction and ability, but they had political and other interests, so that while science was making headway in the universities and provinces the Royal Society followed instead of leading.

Science was becoming specialized and new societies were formed like the Linnean, the Geological, and the Astronomical, while the British Association for the Advancement of Science was established in 1831. The impetus to reform of the Royal Society was given by the constructive criticisms of three of its Fellows—Augustus Bozzi Granville, M.D., F.R.C.P., Charles Babbage, the mathematician, and R. W. Grove, mathematician and physicist. Reform was of gradual growth. From 1847 the Philosophical Club of 47 Fellows watched over and stimulated the Council of the Society, until, its purpose accomplished, in 1901 it merged with the more ancient dining club, the Royal Society Club. In time, therefore, the organization of the Royal Society was altered, and the amateur of science ceased to be elected. By the middle of the nineteenth century the Society had regained its prestige and former authority as the representative of all forms of science, and numbered among its Fellows the most distinguished scientists of the world. In achieving this proud position the medical Fellows have played no small part, as will be seen from the following account of the medical presidents.

THE MEDICAL PRESIDENTS

The Fellows of the Royal Society have duly recognized the claims of medicine to rank as a science in electing members of that profession to the supreme honour of presidency of the Society. Twelve medical presidents adorn the roll. They are all men of the highest scientific attainments, whose claims to this distinction are unchallengeable. Some account of their achievements is appropriate here.

Sir Christopher Wren (1680–1682)

Wren's fame as an architect has quite eclipsed his renown as a medical scientist, but his name appears in the list of those Fellows of the Royal Society who were appointed as members of Council under the First Charter of 1662, as "Christopher Wren, M.D., Prof. of Astronomy, Oxford."

Christopher Wren, born at East Knoyle, in Wiltshire, on October 20, 1632, was the son of Dr. Christopher Wren, Dean of Windsor, and was educated at Westminster School and Wadham College, Oxford. On leaving school at 14, before going up to Oxford in 1649, he acted as prosector of anatomy to Sir Charles Scarburgh for his public lectures at Surgeons' Hall, and made models to demonstrate the action of the muscles. He became B.A., 1650–51, and continued his medical studies at Oxford. He assisted Thomas Willis in dissecting the brain and drew the plates for Willis's book (1654). He studied the anatomy of fishes, of nerves, the mammalian eyes, optics, mathematics, astronomy, and physics. John Evelyn, visiting Wadham in 1654, described him as "that miracle of a youth."

In 1653 Wren was elected a Fellow of All Souls', and proceeded M.A.; and in 1657 he became Gresham professor of astronomy in London and a member of the "Invisible College." In 1661 he became D.C.L.Oxon and LL.D.Cantab., and was appointed Savilian professor of astronomy at Oxford. Already, with his friend Robert Boyle, he had been a pioneer in blood transfusion. In 1656 they injected drugs through a quill to which was attached a syringe (the first hypodermic syringe) into a superficial vein of a dog. Afterwards they attached the blood-vessels of one dog to another through a quill. Further experiments, communicated to the Royal Society in 1666 and 1667, were done by Dr. Richard Lower (1631–91). Pepys in his diary refers to similar experiments at Gresham College.

By 1663 architecture occupied most of Wren's time; and the Great Fire of London (1666) gave fresh scope for his genius, especially as architect of St. Paul's Cathedral. In 1672 he was knighted. Throughout life he maintained his association with the Royal Society, and from 1680 to 1682 he was its president, where he did much to improve its efficiency. From time to time Wren continued to be consulted on scientific matters by Government and by the Society. He was elected M.P. for Plympton in 1685, M.P. for Windsor, 1688–9, and also in 1689–90, but was unseated on petition. He was M.P. for Weymouth in 1701. He died on February 25, 1723, and was buried in St. Paul's Cathedral.

[*Note.*—It is uncertain where Wren obtained his M.D. degree. Through the kindness of Sir Douglas Veale the question is being investigated at Oxford. Wren's studies and anatomical work at Surgeons' Hall with Scarburgh and at Oxford with Thomas Willis, together with his medical experimental work subsequently, fully entitle him to be regarded as the first medical president of the Royal Society.]

Sir Hans Sloane (1727–1741)

Hans Sloane, physician, naturalist, and founder of the British Museum, the son of Alexander Sloane, was born at Killyleagh, Co. Down, on April 16, 1660. In 1679 he began the study of medicine in London. In 1683, in Paris, he attended the Hospital de la Charité, the lectures of Tournefort (botany) and Du Verney

FIG. 1.—Sir Christopher Wren. From the portrait by Sir Godfrey Kneller

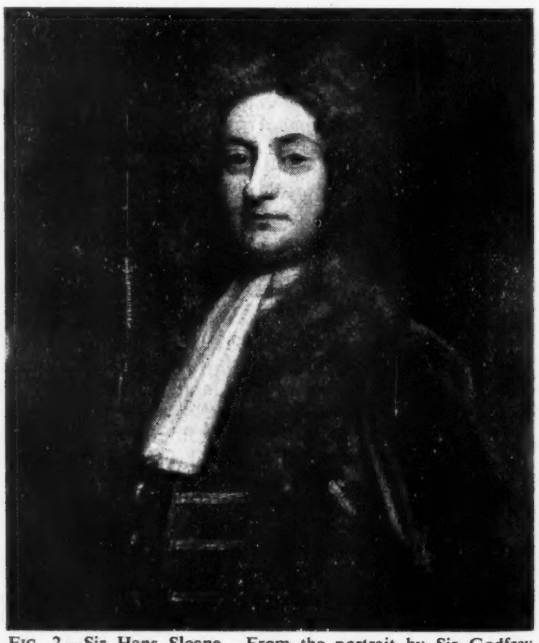


FIG. 2.—Sir Hans Sloane. From the portrait by Sir Godfrey Kneller.

(anatomy), and graduated M.D. at the University of Orange, now extinct. He completed his studies at Montpellier, returned to London to practise, and in 1687 became F.R.C.P. In that year he went out, as physician to the Duke of Albemarle, to Jamaica, where he made a collection of plants for his great work, *The Natural History of Jamaica,* on which his claims to scientific distinction rest. In 1701 he was made M.D.Oxon. Having married a rich widow, for 47 years Sloane lived in Bloomsbury. Here he amassed his large collections of plants, animals, fossils, minerals, books, manuscripts, Egyptian and Roman antiquities, coins, medals, and works of art. Here also he entertained friends, Fellows of the Royal Society, and visitors to dinner and conversaziones. In his practice Sloane studied the individual patient, applied science to medicine, investigated the efficacy of inoculation against smallpox, and thereafter advocated it. He attended Queen Anne in her last illness. In 1714 he was appointed Physician-General to the Army, and in 1716 was created a baronet, the second medical man to receive this honour, Sir Edward Greaves, M.D. Oxon, being the first in 1645 (*Munk's Roll*). From 1719 to 1735 Sloane was President of the Royal College of Physicians.

From Sloane's election as F.R.S. in 1685 he was an active member of the Society. From 1693 to 1712 he was the secretary, and from 1727 to 1741 its president. In both offices he increased the Society's financial resources and enhanced its scientific prestige both at home and internationally. He was a good administrator, and ably presided at the Council meetings. He retired to Chelsea in 1742, where he died in his ninety-third year. He bequeathed his vast collections to the nation for a nominal sum. Parliament added the Cottonian Library and the Harleian manuscripts; and the collections formed the nucleus of the British Museum and the British Museum (Natural History), now at South Kensington.

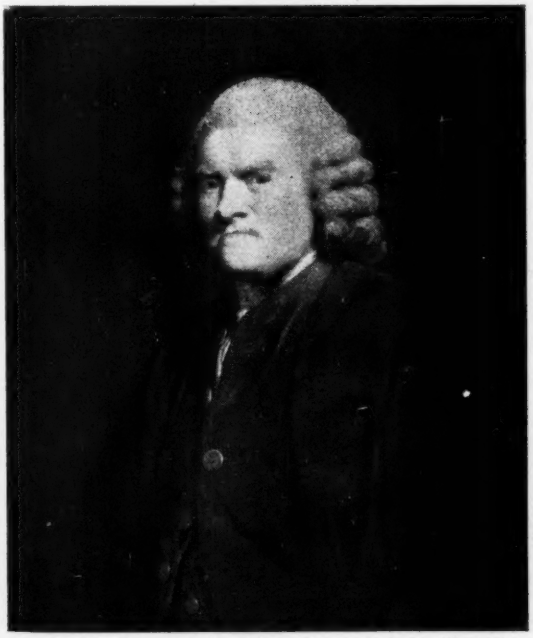


FIG. 3.—Sir John Pringle. From the portrait by Sir Joshua Reynolds.

Sir John Pringle (1772–1778)

John Pringle was the youngest son of Sir John Pringle, of Stichel House, Roxburghshire, where he was born on April 10, 1707. Educated at St. Andrews University and Edinburgh, he was sent to Amsterdam to learn commerce, but in 1728 turned to medicine, studied under Boerhaave, and took the M.D.Leyden in 1730. He then practised in Edinburgh, where he was professor of moral philosophy in the University. In 1742 he went to Flanders as physician to the Earl of Stair, and served in the campaign of 1744. On the recommendation of the Duke of Cumberland Pringle was appointed Physician-General to His Majesty's Forces in the Low Countries. He served with the Duke in the campaign in Scotland (1745–6), and afterwards for two years abroad. He then practised in London, becoming physician to the Duke, physician to Queen Charlotte's household (1761), and her physician in 1763. He was created a baronet in 1766, and became the King's physician in 1774. In 1763 he was elected F.R.C.P. He greatly advanced the study and practice of Army hygiene and the treatment of wounds and sickness in war.

In 1745 Pringle became F.R.S.; in 1753 he was a member of Council, and from 1772 to 1778 president. In office he fostered the spirit of experimental investigation, and his annual discourses were erudite and stimulating. It was during his presidency that the absurd controversy regarding Franklin's pointed lightning-rods arose. For political reasons connected with the American war blunted rods were advocated. The Royal Society supported pointed rods. When George III asked the president to favour knobbed ends, Pringle replied: "Sire, I cannot reverse the laws and operations of nature." Pringle died in London on January 18, 1782, in his seventy-fifth year.

Dr. William Hyde Wollaston (1820)

W. H. Wollaston, physician and chemist, was born at East Dereham, Norfolk, on August 6, 1766, a son of the Rev. Francis Wollaston, F.R.S. He was educated at Caius College, Cambridge, taking the M.B. in 1788 and the M.D. in 1793, and was a Fellow of his College. He became F.R.C.P. in 1795. After practising at Huntingdon and Bury St. Edmunds, he removed to London in 1797. Much affected by the sight of suffering, he abandoned medicine for scientific research in 1800. He had already published a classification of renal calculi based on chemical analysis. He developed a method of preparing malleable platinum in commercial qualities, which gained for him £30,000, and which was made public only after his death. During this work he discovered a new metal, palladium, in 1803 and rhodium in 1804. In optics he invented the total reflection refractometer, the reflecting goniometer, and the *camera lucida.* He established the identity of frictional and voltaic electricity, and the law of multiple proportions, drawing a distinction between atomic and equivalent weights of elements.

Wollaston was elected F.R.S. in 1793, and made many contributions to the *Philosophical Transactions.* He received the Copley medal in 1802 and a Royal medal in 1828. He was secretary from 1804 until 1816; and on the death of Sir Joseph Banks in June, 1820, was elected president until the anniversary meeting in November. Not desiring a contested election, he then

withdrew in favour of Sir Humphry Davy. Wollaston helped to increase the number of scientists on the Council ; and by a liberal donation founded the Society's donation fund for aiding scientific research.‡ He died on December 22, 1828.

Sir Benjamin Brodie (1858–1861)

Benjamin Collins Brodie was born in 1783, the third son of the Reverend Peter Bellenger Brodie, Rector of Winterslow, Wiltshire. He received a sound classical education from his father. In 1801 he came to London and studied anatomy, first under Abernethy and then at Mr. Wilson's school in Great Windmill Street, where he was afterwards demonstrator. In 1803 he entered St. George's Hospital as surgical pupil to Sir Everard Home. After qualifying as M.R.C.S. he assisted Home in his private practice and in museum work at the College of Surgeons. In 1808 he became assistant surgeon and in 1882 surgeon to St. George's Hospital. Brodie attended King George IV, and was Serjeant-Surgeon to King William IV and to Queen Victoria. In 1834 he was created a baronet. He was President of the Royal College of Surgeons in 1844–5 ; and enhanced its dignity and reputation by establishing the new order of Fellows and its high standard of examination.

Brodie was elected F.R.S. in 1810. In November of the same year he gave the Croonian lecture, " On the Influence of the Brain on the Action of the Heart, and the Generation of Animal Heat," and also communicated a paper on " The Effects produced by certain Vegetable Poisons." For his physiological researches he received the Copley medal in 1811. Brodie's great work on *Diseases of the Joints* added to his reputation as the leading surgeon of his time. He also wrote on psychology, indicating that physiological and moral science must be combined for its study.

In 1858 Brodie became the first President of the General Medical Council, and in the same year President of the Royal Society. John Hunter had been the " Founder of Scientific Surgery," and Brodie by his work and researches had made the practice of surgery more scientific. His annual orations as president were eloquent, and display a wide appreciation of many branches of science. In them he dwells on the importance of imagination, properly restrained by observation and experiment, in scientific research. Failing eyesight made him resign the presidency in 1861, and he died at his Surrey seat, Broome Park, Betchworth, on October 21, 1862. His elder son, the second Sir Benjamin Brodie, F.R.S., was Waynflete Professor of Chemistry in the University of Oxford.

Sir Joseph Hooker (1873–1878)

Joseph Hooker, botanist, the son of Sir William Jackson Hooker, K.H., F.R.S., botanist, was born at Halesworth, Suffolk, on June 30, 1817, and educated at Glasgow High School and Glasgow University, where he graduated M.D. in 1839. From 1839 to 1843 he was assistant surgeon and naturalist to Sir James Ross's Antarctic expedition in the *Erebus and Terror*. The fruit of his labours appeared in the following works, which established his reputation: *Flora Antarctica* (1844–7), *Flora Nova Zelandiae* (1853–5), and *Flora Tasmaniae* (1860). He was appointed botanist to the Geological Survey in 1845. From 1846 to 1849 he led a botanical expedition

‡ In this tercentenary year the Council of the Royal Society has accepted an offer by the Isaac Wolfson Foundation to create a special fund of £200,000 for the endowment of a research professorship to be known as the Wolfson Professorship of the Royal Society.

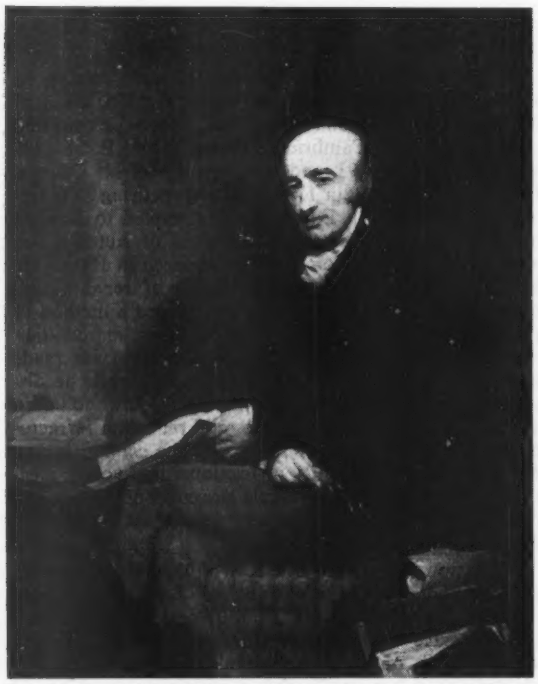


FIG. 4.—Dr. William Hyde Wollaston. From the portrait by J. Jackson.

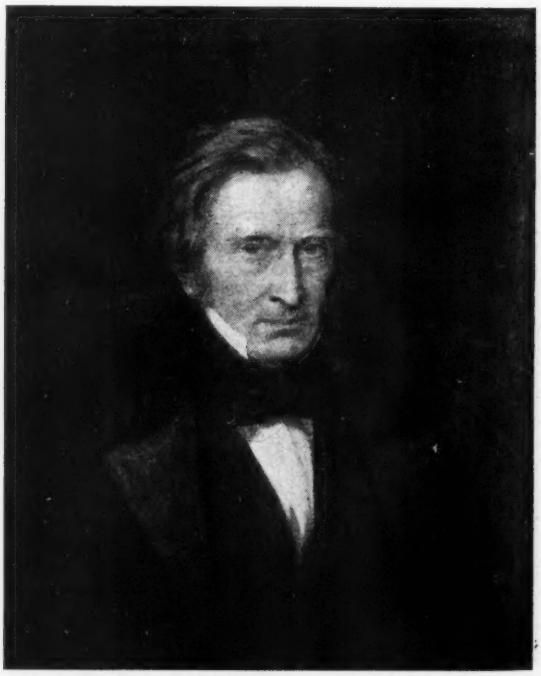


FIG. 5.—Sir Benjamin Collins Brodie. From the portrait by A. Thompson, after G. F. Watts.

to the Himalayas and published accounts thereof. He collaborated with Dr. Thomson in a *Flora Indica* (vol. 1, 1855) and wrote *Genera Plantarum* (1862–83), his most important work. Other books were *Flora of the British Islands* (1870) and a flora of British India (1874). Previously Hooker had become assistant director to his father at Kew, and succeeded him as director in 1865.

From 1873 to 1878 he was President of the Royal Society. His statement that he would serve as president for only five years established a precedent which the Society made statutory in 1935. Hooker's presidency was concerned with abolition of the privilege of peers for election to the fellowship and its restriction to privy councillors; with financial problems, such as cost of the *Catalogue of Scientific Papers*; and with the institution of the Ladies' Soirée. Hooker received a Royal medal in 1854, the Copley medal in 1887, and the Darwin medal in 1892. He was created C.B. (1861), K.C.S.I. (1877), G.C.S.I. (1897), and O.M. (1907). He died on December 11, 1911.

Professor Thomas Henry Huxley (1883–1885)

T. H. Huxley, born at Ealing on May 4, 1825, was the seventh son of George Huxley. He studied medicine at Charing Cross Hospital and graduated M.B.Lond. in 1845. From 1846 to 1850 he went as assistant surgeon, R.N., on an expedition in *H.M.S. Rattlesnake*, which surveyed the passage between the Great Barrier Reef and the Ausralian coast. He was also biologist to the expedition, making a collection of medusae and other marine specimens, whose morphology he described on his return in communications to the Royal and Linnean Societies. In 1851 he was elected F.R.S., and resigned from the medical service of the Navy in 1854. He was appointed lecturer on natural history in the Royal School of Mines and curator to the Museum of Practical Geology the same year, and held these appointments up to 1885. In 1858 he gave the Croonian lecture to the Royal Society "On the Theory of the Vertebrate Skull."

Huxley is famous for his researches on vertebrate morphology and palaeontology, and wrote also on ethnology. His scientific books and papers on his main subjects were numerous and all added to knowledge. They include *Observations on Glaciers* (with Tyndall, 1857). Huxley engaged much in controversy, advocating Darwin's views on evolution and debating with theologians on the subject. He was also interested in educational reform. He held professorships in the University of London, the Royal Institution, and the Royal College of Surgeons. From 1872 to 1881 he was biological secretary of the Royal Society, and had much to do with organizing the *Challenger* expedition, with financial business, and with administering grants for scientific research. From 1883 to 1885 he was president. He received the Copley medal (1888) and the Darwin medal (1894). In 1892 he was made a privy councillor. He died at Eastbourne on June 29, 1895.

Lord Lister (1895–1900)

Joseph Lister, born April 5, 1827, was the second son of Joseph Jackson Lister, F.R.S., of Upton, Essex, a Quaker, who perfected the achromatic lens. Lister went to University College, London, in 1844, graduating B.A.Lond. in 1847. He then studied medicine at the College and University College Hospital; in 1852 he became M.B.Lond. and F.R.C.S. He had already done some original work on the muscular tissue of the iris and on the involuntary muscle fibres of the skin. After resident hospital appointments Lister went to Edinburgh and was Professor James Syme's house-surgeon and assistant. In 1856 he was appointed assistant surgeon

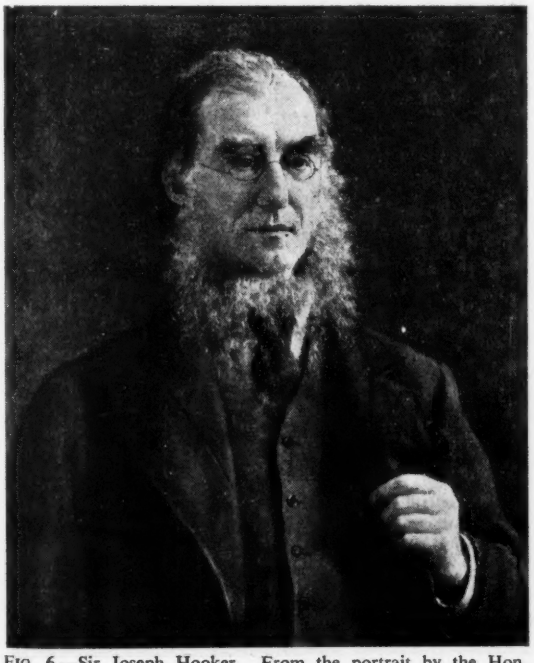


FIG. 6.—Sir Joseph Hooker. From the portrait by the Hon. John Collier.

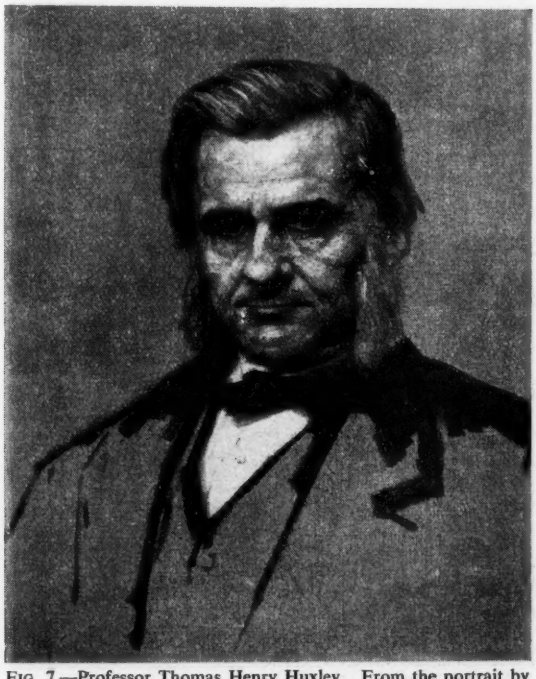


FIG. 7.—Professor Thomas Henry Huxley. From the portrait by A. Le Gros, on indefinite loan to the Royal Society from the Victoria and Albert Museum.

to the Royal Infirmary, Edinburgh, and married Syme's daughter, Agnes. He now began his researches on the early stages of inflammation and coagulation of the blood. In 1860 he became regius professor of surgery in Glasgow University and in 1861 surgeon to the Royal Infirmary, Glasgow. In 1869 he succeeded Syme as professor of clinical surgery and surgeon to the Royal Infirmary in Edinburgh. From 1877 to 1893 he was professor of clinical surgery and surgeon to King's College Hospital, London.

Lister's great work, the introduction of the antiseptic system, based on scientific principles and Pasteur's researches, revolutionized surgery and need not be described here.§ Antisepsis was initiated at Glasgow, continued in Edinburgh, and brought to London. It was the fruit of Lister's persistent study, experimental toil, and scrupulous investigation in the face of much opposition and bitter attacks. In peace and war it saved millions of lives, and Lister was honoured throughout the world. He was appointed surgeon to Queen Victoria, created a baronet in 1883, a baron in 1897; and received the O.M. in 1902, as one of the first 12 members. He died in his eighty-fifth year in 1912, recognized as one of the greatest benefactors of mankind.

Lister was elected F.R.S. in 1860 at the early age of 33. In 1863 he gave the Croonian lecture on coagulation of the blood. He served on the Council and became Foreign Secretary in 1893. From 1895 to 1900 he was President of the Society. Sir Rickman Godlee, his nephew and biographer, wrote:

> "His presidential addresses have no restricted outlook, but range over almost all the sciences, and are a monument to the width and depth of his reading and thinking." Medical subjects had their share in these addresses. For instance, he referred to serum-therapy in cattle-plague, preventive inoculation against cholera and plague; and, in 1901, reviewed from the scientific aspect the work of the Malaria Commission of the Society, appointed in 1888.

In 1902 Lister received the Copley medal. In December the *British Medical Journal* commemorated Lord Lister's jubilee as F.R.C.S. by bringing out a "Lister number." Among the contributors were men who had aided Lister in applying the principles of antisepsis: von Bergmann, Lucas-Championnière, Durante, Bloch, Mikulicz, Ogston, Hector Cameron, Chiene, and Watson Cheyne. Lister's 80th birthday was celebrated all over the world, and his *Collected Papers* were published in two quarto volumes in 1909. They indicate the range of his scientific work in physiology, pathology, and bacteriology, the antiseptic system, and surgery.

Sir Charles Sherrington (1920–1925)

Charles Scott Sherrington, the son of Dr. James Sherrington, of Yarmouth, was born in London on November 27, 1857, and brought up by his stepfather, Dr. Caleb Rose, of Ipswich. He was educated at Ipswich Grammar School, Edinburgh, Caius College, Cambridge, and St. Thomas's Hospital. Graduating M.B.Cantab. in 1885, he investigated cholera in Spain and Italy for the Royal Society and studied at Berlin and Strasbourg. In 1887 he became lecturer in physiology at his hospital,

§Lister's discovery was first announced in the two articles: (1) "On a new Method of Treating Compound Fracture, Abscess, etc., with Observations on the Condition of Suppuration," *Lancet*, March 16, 1867; and, more fully, in (2) "On the Antiseptic Principle of the Practice of Surgery," *Brit. med. J.*, August 9, 1867.

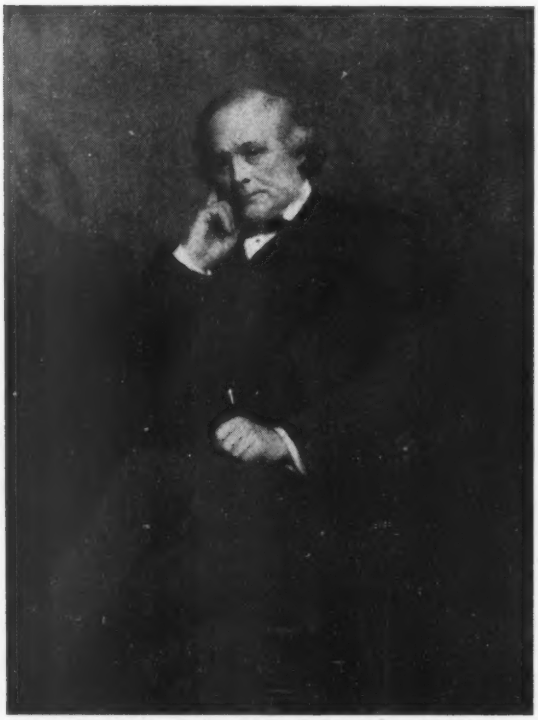


FIG. 8.—Lord Lister. Photograph by the Courtauld Institute of Art. Reproduced by permission of the Royal College of Surgeons of England.

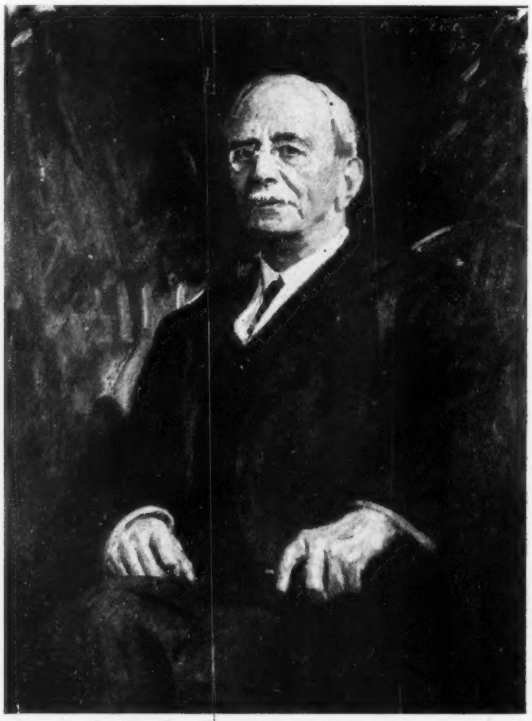


FIG. 9.—Sir Charles Sherrington. From the portrait by R. G. Eves.

and in 1891 was appointed professor-superintendent of the Brown Institution. Although pathology and the treatment of diphtheria by antitoxin partly engaged his attention, his physiological researches on nerve-roots and reflexes gained him his F.R.S. in 1893. In 1895 he was appointed Holt professor of physiology at Liverpool. Here he carried out his famous researches on cerebral localization, which extended the earlier work of Hitzig and Fritsch, of Ferrier, and of Horsley, and investigated the reflex activity of the spinal cord. He published his magnum opus, *The Integrative Action of the Nervous System*, in 1906.

In 1913 Sherrington became Waynflete professor of physiology at Oxford. Both at Liverpool and at Oxford he lectured, administered, taught, and attracted students, several of whom became distinguished physiologists. He founded modern knowledge of the brain and spinal cord. In the first world war he studied industrial fatigue in war factories for the War Office, and to test the conditions worked as a day labourer in a munitions factory. He served on Government committees, and in 1918 was chairman of the Industrial Fatigue Board. Until his retirement in 1936 he continued his researches on reflexes, cortical localization, and discharge mechanisms of the nervous impulse. He was created G.B.E. in 1922 and O.M. in 1924. With Lord Adrian he received the Nobel prize for medicine in 1932.

Sherrington was awarded by the Royal Society a Royal medal in 1905 and the Copley medal in 1927. He was President of the Society from 1920 to 1925, his administrative ability fostering general scientific progress. Scientist and poet like Goethe, on whom he threw fresh light in his lecture, "Goethe on Nature and on Science" (1942), his collected poems, *The Assaying of Brabantius and other verse*, appeared in 1925, and were written with "beauty, sincerity and feeling." Sherrington's too rare excursions into general literature and philosophy revealed great facility and felicity of expression. In his last years, crippled with arthritis in a nursing-home at Eastbourne, his mind remained alert and vigorous; and he contributed his reminiscences of Sir William Osler to the *British Medical Journal* in 1949. He died on March 4, 1952, in the ninety-fifth year.

Sir Frederick Gowland Hopkins (1930–1935)

F. G. Hopkins, son of Frederick Hopkins, was born at Eastbourne on June 20, 1861. He was educated at private schools and at the City of London School. After a city clerkship, articled pupilage to a consultant chemist, studying chemical analysis at the School of Mines and in a private laboratory, he was a student at University College, London, and became an Associate of the Institute of Chemistry. He was next assistant to Sir Thomas Stevenson, the Home Office analyst, in cases of poisoning. In 1888 he entered Guy's Hospital Medical School with the first Gull research studentship, graduating B.Sc. in 1890 and M.B.Lond. in 1894. He devised a method for determining uric acid in urine (*Guy's Hosp. Reps.* (1891), and *Proc. Roy. Soc.*, 1893), and investigated the close relation of uric acid to the white and yellow pigments in the wing scales of butterflies (*Chem. Soc.*, 1889, and *Phil. Trans.*, 1895). After working under Starling as demonstrator of physiology and researching on the chemistry of the proteins, he went to Cambridge, at the invitation of Sir Michael Foster, as University lecturer and then reader in chemical physiology. He was also supervisor of medical studies at Emmanuel College.

At Cambridge Hopkins made the important discoveries which established his fame as a biochemist and brought him the fellowship of the Royal Society. In 1901, with S. W. Cole, he identified the amino-acid tryptophan; in 1906 he participated with W. M. Fletcher in researches on the production of lactic acid in muscular activity and its subsequent removal by oxidation; and they jointly gave the Croonian lecture on muscle respiration before the Royal Society in 1915. In 1906 Hopkins announced the importance of certain "accessory factors," now known as vitamins, in normal diets. Earlier accounts of these "accessory factors" had been forgotten; and the prolonged and careful work of Hopkins on this subject, elaborated in his famous paper in the *Journal of Physiology* in 1912, deservedly gained him the Nobel prize for medicine in 1929. In 1910 Trinity College appointed him a Fellow and praelector in biochemistry. In 1914 he became professor of biochemistry, and in 1923–4 was appointed the first Sir William Dunn professor of biochemistry and head of the associated Institute of Biochemistry, Cambridge. In 1921 he had discovered glutathione, and in 1929 he proved that it was a tripeptide of glutamic acid, glycine, and cystein. He also discovered xanthinoxydase, a specific enzyme in milk and the tissues.

Hopkins rendered great assistance to the Medical Research committee and its successor, the Medical Research Council. In 1918 he was awarded a Royal medal of the Royal Society; in 1925 a knighthood; in 1926 the Copley medal; and from 1930 to 1935 he was President of the Royal Society. A conscientious and dignified president, his speeches and addresses stimulated thought. In 1935 he received the O.M. He served on the Ministry of Health's Advisory Committee on Nutrition for several years and exercised a wise influence in its councils.

Hopkins achieved his ambition to make biochemistry a living and growing science. He died at Cambridge on May 16, 1947, in his eighty-sixth year.

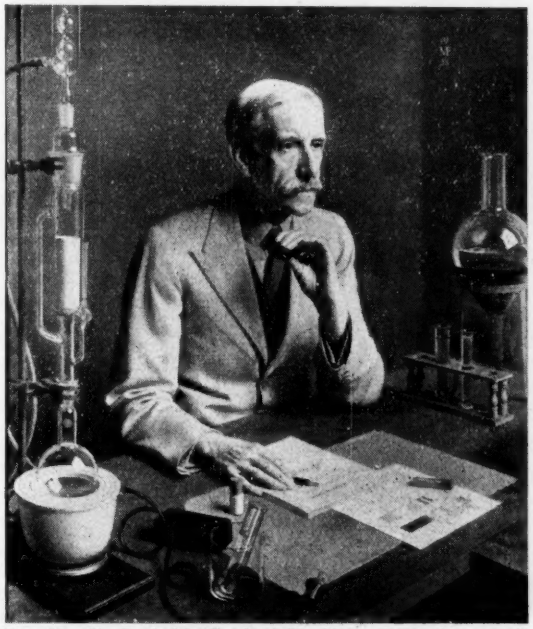


FIG. 10.—Sir Frederick Gowland Hopkins. From the portrait by Meredith Frampton.

Sir Henry Dale (1940–1945)

Henry Hallet Dale, son of C. J. Dale, was born in London in 1875. He was educated at the Leys School, Cambridge, and at Trinity College, Cambridge (scholar, Coutts-Trotter student). He then went to St. Bartholomew's Hospital, graduating M.B., B.C.Cantab. in 1903, and M.A., and M.D. in 1909. He was Sharpey Scholar, University College, London; and then director of the Wellcome Physiological Laboratories from 1904 to 1914. In 1914 he was appointed head of the Department of Biochemistry and Pharmacology of the Medical Research Committee. In 1920 he became director of the Institute of Medical Research; and later Fullerian professor of chemistry and director of the Laboratories of the Royal Institution and chairman of the Wellcome Trustees. Created C.B.E. in 1919, he was knighted in 1932, and created G.B.E. in 1943. In 1944 he received the O.M.

It is impossible here even to enumerate the advances made by Dale in physiology, biochemistry, and pharmacology, many of which have now their application in medicine. For his work on ergot, with the isolation of ergotoxine, and discovery of tyramine and histamine in ergot extracts, he was elected F.R.S. in 1914. Further researches led to the identification of acetylcholine as the substance liberated at parasympathetic endings, and at the endings of preganglionic fibres in autonomic ganglia. It was later shown that acetylcholine was also liberated at the endings of voluntary motor nerves. In 1936 Dale shared the Nobel prize with Professor Otto Loewi for his brilliant work on the chemical transmission of the effects of nerve impulses. Valuable also was his work on the standardization of posterior-lobe extract of the pituitary body, on the potency of neoarsphenamine, the standardization of insulin, and international standardization, etc.

Dale's books and many papers are written with lucidity and literary felicity. He is an able and wise administrator. He was one of the secretaries of the Royal Society from 1925 to 1935 and Copley medallist in 1937; and in 1957 he was awarded the gold medal of the British Medical Association. From 1940 to 1945 he was President during very difficult years, and exercised a most important and beneficial influence on wartime scientific advances.

Lord Adrian (1950–1955)

Edgar Douglas Adrian, son of Alfred Douglas Adrian, C.B., K.C., of the Local Government Board, was born on November 30, 1889. He was educated at Westminster (King's Scholar), Trinity College, Cambridge, and St. Bartholomew's Hospital (M.A., M.D.Cantab. 1919, F.R.C.P. 1924). After holding the post of resident medical officer at the National Hospital for Nervous Diseases, Queen Square, London, he returned as a Fellow of Trinity College to Cambridge, and began with Keith Lucas his investigation into the fundamental activity of the nerve cell; they also experimented with the thermionic cell to investigate the electrical activity associated with nervous action. After Keith Lucas's death in 1917, Adrian continued the researches into the nature of nervous activity. "It was not until he had reinvestigated the discoveries of Berger that all the implications of changes in brain potentials were fully and widely appreciated and led among other things to the clinical use of the encephalogram." He was elected F.R.S. in 1923. Professor A. V. Hill, writing in 1937, the year in which Adrian became professor of physiology at Cambridge, summed up his work in these words: "To have given a new quantitative basis to nervous behaviour, to have shown that afferent or efferent effect in any given neurone depends on the pattern in time of

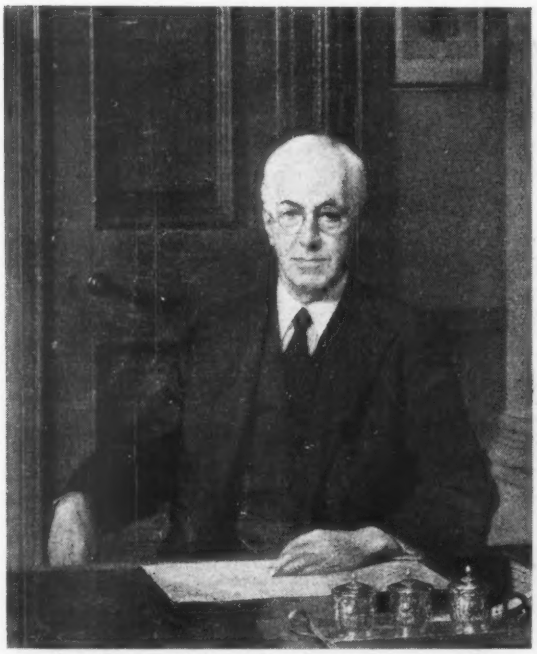


FIG. 11.—Sir Henry Dale. From the portrait by James Gunn.

FIG. 12.—Lord Adrian. From the portrait by A. R. Middleton Todd.

the impulses which travel in it, is the great achievement of Adrian's recent work. In it he and his pupils have explored the activity of the single neurone, the single sensory end-organ, the single muscle group, their excitation, their adaptation, their fatigue."

Lord Adrian's work has received world-wide recognition. In 1942 he received the O.M., and in 1955 he was created a baron. He was Nobel Laureate (Medicine) with Sherrington in 1932. He has the Royal and Copley medals of the Royal Society; and the gold medals of the Royal Society of Medicine and of the British Medical Association. Over 20 universities have awarded him honorary degrees. He is Chancellor of the University of Leicester and Master of Trinity College, Cambridge, and was Vice-Chancellor of the University (1957–9) and President of the British Association. He was Foreign Secretary of the Royal Society from 1946 to 1950, and from 1950 to 1955 its President. In that office he displayed his administrative talents in advancing scientific progress generally. It is interesting to note how the work of three medical presidents—Sherrington, Dale, and Adrian — has progressively illuminated knowledge of the physiology of the central nervous system.

CONCLUSION

Science, including medical science, has made mighty strides within the three hundred years of the Royal Society. The infant has become a giant of awe-inspiring and even terrible potentialities.

In these three centuries there have been vast changes in political and social life. Power has been transferred first from an absolute monarchy to a privileged oligarchy and then to a democracy. The practical applications of science in engineering, the steam engine, electric lighting, the bicycle, and the internal combustion engine in the motor-car and the aeroplane have effected profound alterations in communication and social life. Modern discoveries have endowed mankind with wonderful and stupendous knowledge. The absolute space of Newton and the uniform flow of time have been displaced by Einstein's theory of relativity. Electromagnetic waves are utilized to carry messages all over the world. The structure of the atom has been discovered, the transmutation of elements is no longer a derided dream of the mediaeval alchemists. The exploration of space is a possibility, and the secrets of atomic energy, both beneficial and destructive, together with *x* rays, radium, and countless other physical and chemical marvels, have been revealed. In this progress medicine has shared. It has become more scientific through the sustained work of medical scientists. Many diseases are now preventable. Others which formerly prevailed have been eliminated. Anaesthesia, aseptic surgery, antibiotics, and blood transfusion save countless lives; and new sciences are comprehended in medicine. In all these advances the Royal Society has exercised an encouraging and beneficial influence. We may rest assured that the medical presidents and fellows of the future will continue to help its prestige and authority as they have done throughout three hundred years.

I wish to thank Professor A. V. Hill, F.R.S., and Mr. I. Kaye, Librarian of the Royal Society, for certain information in connexion with this article.

[All the photographs, except that of Lord Lister, were taken by the Royal Society's official photographers, R. B. Fleming and Co., Ltd., and are reproduced by courtesy of the Society.]

C

BIBLIOGRAPHY

Sprat, T. (1702). *The History of the Royal Society of London*, 2nd ed. London. First published in 1667.

Birch, T. (1756). *The History of the Royal Society of London* (4 vols.). London.

Weld, C. R. (1848). *A History of the Royal Society* (2 vols.). London.

Lyons, Sir Henry (1944). *The Royal Society, 1660–1940: A History of its Administration under its Charters*. Univ. Press, Cambridge.

Stimson, Dorothy (1949). *Scientists and Amateurs: A History of the Royal Society*. Sigma Books, London.

Medical Presidents

Munk's Roll of the Royal College of Physicians (1878), Vols. I–III; Ibid. (1955), vol. IV. London.

Dictionary of National Biography.

de Beer, G. R. (1953). *Sir Hans Sloane and the British Museum*. Published for the Trustees by Geoffrey Cumberlege, London.

Brooks, E. St. John (1954). *Sir Hans Sloane*. The Betchworth Press, London.

Singer, Dorothea Waley (1949, 1950). "Sir John Pringle and His Circle," *Annals of Science*, **6**, 127–180; 229; 248.

William Hyde Wollaston, Brit. med. J., 1953, **2**, 992.

Holmes, T. (1898). *Sir Benjamin Collins Brodie*. Fisher, Unwin, London.

Cope, Sir Zachary (1959). *The Royal College of Surgeons: A History*. Blond, London. (Contains a number of references to Brodie and to Lister.)

Huxley, L. (1900). *Life and Letters of Thomas Henry Huxley*. Macmillan, London.

Cheyne, W. Watson (1913). "Lord Lister," *Proc. roy. Soc. Lond.*, **86**, i–xxi.

Godlee, Sir R. J. (1924). *Lord Lister*, 3rd ed. Clarendon Press, Oxford.

Liddell, E. G. T. (1952). *Charles Scott Sherrington, 1857–1952: Obituary Notices of Fellows of the Royal Society* [No. 21], **8**, 241–270. London.

Adrian, Lord (1957). "The Analysis of the Nervous System," Sherrington Memorial Lecture. *Proc. roy Soc. Med.*, **50**, 991–998.

Lord Cohen of Birkenhead (1958). *Sherrington, Physiologist, Philosopher, and Poet*. Univ. Liverpool, The Sherrington Lectures. Liverpool Univ. Press.

Dale, H. H. (1948). *Frederick Gowland Hopkins, Obituary Notices of Fellows of the Royal Society* [No. 17], **6**, 115–145.

"Sir Henry Dale, P.R.S.," *Brit. med. J.*, 1940, **2**, 791.

Adrian, Lord, Loewi, O., Burn, J. H., Gasser, H. S. (1955). "Tributes to Sir Henry Dale on his 80th Birthday," *Brit. med. J.*, **1**, 1355.

"Professor E. D. Adrian, P.R.S.," *Brit. med. J.*, 1950, **2**, 1320–1321.

The motor in medical practice, 1901: "In order to reply to the many queries made since I first used a motor in my practice I am publishing a résumé of my experiences. The motor is a 2¾ h.p. de Dion convertible quad or tricycle. It is comfortable on good roads as a tricycle but rough on a bad, being comfortable as a 'quad' for the passenger in front but less so for the driver. Steering and control are perfect. The pace varies from 3 to 30 miles per hour, 16 miles an hour is ample. The cost of running is from ½ to ¼ penny per mile according to the condition of the road. The driving is perfectly simple and easily learned. The diagnosis of faults constitutes the real difficulty in dealing with any motor. I have been delayed even an hour, but when discovered the fault was easily put right in five minutes: experience is necessary. The machine, in good weather, with this reservation is perfectly reliable, but in bad weather requires many improvements and modifications. . . . I have prepared a comparison of our present horse and motor costs. My average verified runs amount to, say, 100 miles per week. Horse keep and repairs to vehicle, but excluding wage, total 16 shilling per week. Running costs of a car with repairs 8 shillings per week. I use a bicycle a good deal but my horse costs me none the less. Except for sinking fund my motor costs me nothing when not in use. If prepared to take the trouble anyone can understand how to manage a motor. A medical man especially. It doubles my earning capacity." (From the *Australasian Medical Gazette*, October, 1901. Quoted in *Med. J. Aust.*, June 4, 1960.)

A RIDDLE OF THE SEVENTEENTH CENTURY

THE LINACRE LECTURE*

BY

Sir CHARLES DODDS, M.V.O., M.D., F.R.C.P., F.R.S.

Courtauld Professor of Biochemistry in the University of London at Middlesex Hospital Medical School; Harveian Librarian of Royal College of Physicians

It is not necessary to enlarge to the Master and Fellows of this College on the emotions engendered by an invitation to give the Linacre Lecture. The pleasure of being selected is immediately counteracted by the grave responsibility involved, and when one considers the list of previous holders of this office it is not possible to avoid acute anxiety as to whether one will be able to justify the choice. In this particular year even greater responsibility is imposed on the lecturer in view of the fact that Linacre was probably born just 500 years ago.

I am not unaware that others who have preceded me have prefaced their lectures with a brief portrait of some aspect of the life and work of the man whose memory is enshrined in them, and I could perhaps follow the same pattern with more reason in view of the special significance of this occasion. Furthermore, I have the honour to be Harveian Librarian of that Royal College for whose foundation Thomas Linacre was so largely responsible and towards the establishment of whose library he gave so many of his own books, all of which unhappily perished in the Great Fire of 1666. A similar fate also befell almost all the books from the library of William Harvey.

There is a striking similarity between Linacre and Harvey in some respects; both were benefactors of the College of Physicians; both instituted lectures, though with slightly different intent; both were associated with Canterbury and Cambridge; and both acquired medical degrees at Padua. In fact, Linacre has been called "the intellectual grandfather of Harvey" (Payne, 1897).

The Terms of the Lecture

It is interesting to note that, whereas successive Harveian Orators have been unanimous in their praise of William Harvey, Linacre lecturers have varied from praise, damning with faint praise, and even passing harsh judgment. But by what standards are we to assess the achievements of Linacre? Surely by taking note of the times in which he lived and not by appearing to be wise after those events. When he set up his two series of lectureships at Oxford and Cambridge it is not certain what end he had in view. It has been suggested that his act was simply that of a wise old man to encourage the study and teaching of medicine (Osler, 1908). In the original deed, however, so far as the Cambridge lectureship is concerned, no provisions were made for the subject of the lectures. Some 50 years passed before it was laid down that the lecturer was to expound Galen's *De sanitate tuenda* and *Methodus medendi* as translated by Linacre. He was to be at least a Master of Arts who had studied Aristotle and Galen, and, while he was in office (it was a four-year period), he was not allowed to practise medicine. These provisions operated until well on into the nineteenth century (Rolleston, 1932).

When Linacre returned from Italy about the end of the fifteenth century, no control was exercised over the medical profession in this country. In 1511 an attempt at such control was made in an Act which forbade anyone to practise as a physician and surgeon unless he had been examined by the Bishop of London or the Dean of St. Paul's (beyond London, the bishops or their vicars-general). In the examination of candidates they were to have the assistance of four doctors of physic and for surgery other expert persons in that faculty. How effective these powers were may be open to doubt, since seven years later, on the instigation of Thomas Linacre, the Royal College of Physicians of London was incorporated and given power to proceed against any person practising medicine in London and within seven miles without the Licence of the College. This power was confirmed and extended in 1522, when the College was given authority to examine and license all physicians in England except graduates in medicine at Oxford and Cambridge, over whom they had no control as long as they kept out of London. Surviving records contain nothing to suggest that in making provision for the control of the profession Linacre also envisaged any scheme of medical education.

I have already referred to the syllabus of the Linacre lectures, which continued without revision for several centuries. This stagnation is reflected in medical teaching in the universities. So far as Cambridge was concerned, from the birth of the university until the nineteenth century medical teaching consisted in the reading and expounding of Hippocrates, Galen, and Aretaeus, and was devoid of the experimental method in which Harvey could have led the way (Rolleston, 1932). University education was theoretical rather than practical. At Oxford the situation was much the same. The obligation to take an M.A. degree before a degree in physic meant studying for fourteen years. By the eighteenth century no lectures were delivered; no attempt was made to enforce medical study; and degrees were granted without any test. The only real medical education was that to be obtained on the Continent at Padua or later Leyden, for example.

The Importance of Padua

Linacre's achievement in translating into Latin the works of Galen has been criticized as labour spent "in putting a brighter polish on the fetters that held medicine in thrall" (Topley, 1940). The contrary view, and one that is no less justified, was expressed by Professor Charles Singer in his Lloyd Roberts Lecture, though Linacre is not mentioned by name: "Among the welter of inter-related activities that characterized the period [the Renaissance], there were four that made a special impact on anatomy. Between them they determined its course and deflected it from being a mere rebirth of the ancient discipline." One of those factors was the publication of the ancient anatomical texts from which

*Given before the Master and Fellows of St. John's College, Cambridge, on May 6, 1960.

the new anatomy could take its start. By the new anatomy is meant the work of Vesalius and his successors. The place primarily associated with this is Padua, and it was to Padua that another physician prominent in the annals of the Royal College of Physicians went—namely, John Caius. It is generally held that at Padua he came under the influence of Vesalius, whose *De Fabrica* was published in 1543. On his return to this country from Padua, Caius made what some have considered his greatest contribution to the course of scientific progress in medicine. I refer to the lectures and demonstrations in anatomy he instituted at the Barber-Surgeons' Hall about 1546: it was there rather than at the College of Physicians, because the latter had no facilities for obtaining dead bodies for dissection. This deficiency was remedied in 1564 by the granting of the Charter of Anatomies, probably at the instigation of John Caius; anatomical lectures were established soon after, and an anatomical theatre built some years later.

It was to the refounded Caius College that William Harvey went, but this was not until about ten years after the foundation of the new series of Lumleian Lectures (1582), with which his name will be for ever linked. These lectures were originally offered to the Barber-Surgeons, but for some reason were declined. The original syllabus was an ambitious one extending over six years. The first lecturer was Dr. Forster, who discharged his duties in such a manner that "each one present indued with judgement, conceived such hope of the doctor, touching the performance of all actions incident unto him by that place, as some of them continued his auditors in all weathers, and still hold out" (Holinshed, 1808). The fact that the appointed lecturer was expected to spend two years travelling in France, Germany, and Italy "to the intent that he may hear the best and most learned and expert surgeons read and see their practices; whereby he may be the better able to execute the said place of reading in the said College of Physicians in London at his return into England" (Goodall, c. 1680–1700) showed that the intention of the founders was sound enough and that they realized that anatomical and surgical knowledge on the Continent was far in advance of that in England.

While Dr. Forster was reading his lectures, William Harvey was already, by his studies at Cambridge and later at Padua, fitting himself to become Fellow of the College (1607) in line to succeed to the Lumleian Lectureship in 1615. Robert Forster had been succeeded first by William Dunn and then by Thomas Davies, who died in August, 1615. It was some time during this series that Harvey demonstrated the circulation of the blood and committed the results of his experiments to print in 1628. It is, perhaps, not untrue, therefore, to claim that Linacre, through Caius, was the intellectual grandfather of William Harvey.

"De Motu Cordis"

At the time of Linacre's life and active period medicine was dominated entirely by the Galenical tradition. The whole of pathology and origin of disease was described and attributed to variations of the four humours. This system has been so thoroughly described that it is not necessary for me to go into it here. The whole of medical treatment was based on this principle, and of course the practitioners had no knowledge of basic physiology as evinced particularly by the circulation. Many writers and teachers have an entirely erroneous view of the growth of knowledge in the seventeenth century. To students it is frequently indicated that prior to the time of Harvey all was utter chaos, and that after Harvey all was scientifically straightforward. The publication of *De motu cordis* in 1628 provided, for those who read it, a logical account of the circulation without which no system of physiology, pathology, or therapeutics could survive. An impression exists in many students that immediately after the publication of *De motu cordis* a complete revolution took place and that modern medicine was actually born from that date. In my capacity as Harveian Librarian at the Royal College of Physicians for the last ten years I have made a very special study of the writings of eminent physicians from the Harvey period up to the end of the eighteenth and nineteenth centuries, and it is my purpose to present to you in the course of this lecture a problem to which I myself have found no adequate answer. My problem is why did these brilliantly clever men who followed Harvey fail to apply the lessons of *De motu cordis* to their own practice of medicine? We might even go farther and try to inquire what effect Harvey's researches had on his own practice of medicine. Let us begin by glancing at the famous book *De motu cordis*. This appeared in 1628, and was published at Frankfurt, where the annual Book Fair would ensure wide publicity. It was not known exactly how many copies were printed, but possibly the number was 500–1,000. To-day, some 50 examples of the first edition are known. Written in Latin, the book is certainly not easy to read, but fortunately the student of to-day is provided with the excellent translation of Professor Kenneth Franklin. This sets out in very great clarity the striking way in which Harvey drove home the points of the circulation. To those who are not familiar with the work I would like to quote one or two passages from Franklin's translation:

> "But there are also very many points about the arteries which similarly illustrate and bear out the truth of my contention. For instance, Why does the vein-like artery not pulsate, though it is numbered among the arteries? or, Why is a pulsation felt in the artery-like vein? The answer to both questions is that the inthrust of blood into the arteries is the cause of their pulsation (and such inthrust occurs into the latter vessel, but not into the former one). Again, one is asked, Why do the arteries differ so much from the veins in the thickness and strength of their walls? To this the reply is that it is the arteries which bear the brunt of the heart's vigorous outthrust and of the blood's violent inflow. Hence, as perfect Nature makes nothing in vain and is sufficient in all respects, the nearer the arteries are to the heart the more they differ in structure from the veins, and the stronger and more ligamentous they are than these. On the other hand, in their most distant disseminations, such as those in the hand, foot, brain, mesentery and the spermatic ones, the two sets of vessels are so similar in structure that it is difficult, from a visual inspection of their coats, to distinguish one from the other. This is, however, justly so, for the farther the arteries are from the heart, the much smaller is the force with which they are struck by the cardiac impulse, weakened as it is by the great distance which it has travelled. Further, though the impulse in question must have been adequate, for the blood in all the arterial trunks and their branches, it is reduced by some fraction at each division so that the ultimate hair-like arterial branches seem to be veins not only in structure but also in function. For their perceptible

pulsation is either nil or intermittent, and even in the latter case occurs only when the heart beats with unusual violence, or an arteriole is dilated or over-widely open in some small section. It is on this account that we are able, at some times but not at all times, to feel a pulsation in the teeth and in swellings, and in the fingers. Children always have quick and rapid pulses, hence it is only through the sign which I have mentioned that I have seen for certain that they were labouring under fever. Similarly in tender and delicate subjects I have readily been able, by pressing on the fingers, to ascertain from the digital pulse the time of a febrile attack. On the other hand, when the heart beats over-languidly, it is not only in the fingers but also in the wrist or temples that I have failed to detect a pulse; this I have experienced in cases of fainting, of onset of hysterical symptoms, and of asphyxia, also in over-weak subjects and in those about to die" (Harvey, 1958, pp. 108–9).

Another passage almost at the end of the work indicates quite clearly Harvey's grasp of the situation.

"A related question is, Why in making an anatomical dissection do we find the vein-like artery and the left ventricle so very full of blood which is identical with that filling the right ventricle and the artery-like vein and, like it, dark in colour and tending to clot? The reply is that the blood passes through the lungs from the latter site to the former one. Two final queries are, first, Why does the artery-like vein, as it is commonly called, have the structure of an artery and the vein-like artery that of a vein? The answer is that, contrary to general belief, the former is in truth an artery, and the latter a vein, both functionally and structurally and indeed in every respect. The second query is, Why has the artery-like vein so wide an opening? and the anwer to it is, Because it carries much more than is necessary for the nutrition of the lungs" (ibid., p. 111).

These two brief quotations indicate quite clearly that a detailed and striking description was given of the systemic and of the pulmonary circulation. It must of course be remembered that the capillary connexion between arteries and veins had not yet been discovered owing to the lack of the microscope, but Harvey very clearly saw that there must be some connexion between the arteries and the veins in order to allow for the return of blood from the venous system to the arterial system.

Harvey's book came to be recognized throughout the world as a scientific and physiological classic, and, while certain attacks were made on his theories, these very quickly subsided and in about 50 years' time the concept of the circulation was recognized. By universal approval Harvey is regarded as one of the greatest scientists of all time, showing these great characteristics of the true scientist—namely, excellent experimental technique, accurate observation, and correct and brilliant deduction.

The Domination of Galen

Now, as we have already said, medical thought of Harvey's day was dominated by the Galenical conception of the four humours, and it is obvious to us that this doctrine is quite incompatible with that of *De motu cordis*. The humoral theory was based entirely on speculation and had no experimental evidence in its favour at all, and one would have thought that Harvey would have immediately discarded it and that his own brilliant investigations would have been reflected in his treatment. Unfortunately little direct information of a documentary character exists as to his acutal prescriptions, but a study of contemporary literature, particularly that of those who were his companions, would indicate that his treatment was quite unaffected by the brilliant discoveries that he had made. He appears to have continued to practise in the Galenical method based on the theory of the four humours. A study of the writings of Ent, Harvey's great friend and, as we know, the one responsible for the publication of Harvey's *De Generatione*, shows that there could have been nothing unorthodox from the Galenical point of view concerning the Master's treatment, as undoubtedly a contemporary such as Ent would have referred to it in his writings. We are therefore driven to the conclusion that Harvey himself continued in this old-fashioned and obviously useless treatment which his own researches should have ousted.

What is the reason for this? How can it be that a man of such astonishing intellect and clarity of vision could still continue with this mediaevalism? Before trying to answer this, let us look at some other figures of the same or just later period. Students of the history of medicine are unanimous in agreeing that Thomas Sydenham was one of the greatest figures of seventeenth-century medicine. Born in Dorsetshire in 1624, and educated at Oxford, he interrupted his studies at that University to serve in the Civil War on the side of the Parliament. He later returned to Oxford and studied medicine. He was created a Bachelor of Medicine in April, 1648; he became a Fellow of All Souls and continued to practise medicine in Oxford. In the year 1661 Sydenham came to London and settled in Westminster. He was admitted a Licentiate of the College in 1663, and thereafter developed one of the greatest practices in the City of London. He wrote extensively, particularly on the treatment of fevers and on the plague. These works are available to us in an excellent translation provided by the Sydenham Society. A careful study of these works indicates an astonishing clinical grasp of a very wide number of diseases; in fact it is generally admitted that the descriptions given of clinical conditions have never been bettered. Sydenham also brings a considerable scepticism with regard to treatment, and it is from this point of view that it is very interesting to see what his views were about the circulation. Having studied the writings carefully one is convinced that he also was under the influence of the old Galenical tradition, and that the truth of the circulation, if known to him, certainly did not affect his treatment. Sydenham's views are best summed up in his own words in Section 1 of his "History and Cure of Acute Disease":

"Such are the conditions complicating and interwoven with the very essence of humanity, and that so closely that no one can succeed in wholly making himself independent of them. Hence Nature, in the concatenation of symptoms, has provided a method for the elimination and exclusion of the peccant and foreign matter, which, otherwise, would undo the whole fabric of our frame; and infinitely oftener than we find to be the case would she gain her end, and attain the restoration that she aims at in these ungrateful remedies, if she were not diverted by ignorant men from the straight way that, of herself, she holdeth" (Sydenham, 1848, i, pp. 29–30).

With such a declaration of faith one would have anticipated the sweeping away of the old-fashioned and outmoded treatments, but if we turn to the details of his treatments we find that they are all influenced and clouded by the old humoral theory. In his remarks about the treatment of apoplexy by bleeding it is quite

clear that he is concerned with removing the poisonous humour rather than relieving a medical condition. This is borne out by the following sentence:

> "But forasmuch as bleeding alone may not be effectual enough to remove the cause of this mischief, it is necessary to attempt remedies that evacuate by purging which, though it does not immediately reach the morbific matter as bleeding, yet by emptying the humours of the blood into the bowels, it diverts the more plentiful recourse of humours to the brain; and, by turning the stream inward upon the bowels, doth much restrain their impetus upon that part which is the seat of this disease" (ibid., ii, p. 345).

One could quote many other examples in Sydenham's work, and we must come to the conclusion that this most enlightened physician who did so much to remove from medicine many of the useless practices of Galenism still was not influenced by the work of Harvey on the circulation.

The ablest men in the medical profession, if they had a strong scientific bent, turned their attention to subjects other than medicine—to biology, physics, geology, psychology and philosophy, or demography. It seemed that as a field for scientific research medicine offered them little attraction as distinguished from empirical and traditional routine.

The College and the Royal Society

Why, it may be asked, could such men not find at the Royal College of Physicians of London opportunities to conduct their research? Was it outside the terms of reference of the College? Was the College opposed to such advance? There is nothing to show that Harvey's discovery, and the spirit in which he made it, was in any way unacceptable to the College. There was, however, one man who, though not holding the office of President, could, as Treasurer, exercise considerable influence. He was Baldwin Hamey. His biographer writes:

> "Chemistry too now began to come in vogue which Dr. Hamey could not well be reconciled to, from his Galenical principles and at his age. Neither . . . was there room for the new scientific ideas, which had found a forum at the Royal Society. For Hamey this new foundation represented a destructive rival to his beloved College and a threat to the integrity of the profession for which it stood. He was uncompromising in his loyalty, and found it impossible to reconcile Fellowship of the College with Fellowship of the Society; in the action of Sir William Petty, Dr. Willis, Dr. Glisson, Dr. Goodall, Dr. Millington, and other Fellows who contributed to the new Foundation, he saw an act of betrayal. The Restoration was awakening forces which had to be resisted. He felt it was a time when the College required their undivided allegiance" (Keevil, 1953).

The records of the College contain no reference to the Royal Society, and one is therefore led to the view that this objection was individual rather than collective, although, as we have said, Hamey's influence within the College was considerable. It may therefore well have been that, rather than come in conflict with a beloved benefactor of the College, for such Hamey had been, Fellows felt inclined to find an outlet for their scientific activities in the Royal Society.

To return to those Fellows, it is curious to notice how Willis, deservedly famous for his book on the anatomy of the brain, in his tract on fevers published in 1659 recognized that the discovery of the circulation had established a new foundation for medicine, and discredited the Galenical doctrine of the constitution of the blood; and then to notice how he clears away the ancient rubbish of the four humours only to replace it with another hypothesis, and takes this for the basis of all his reasonings on fevers, for his explanations of their phenomena and his indications for their treatment.

Richard Lower in his *Tractatus de corde* (1669) refers to his experiments in connexion with blood transfusion, experiments originally reported in the *Philosophical Transactions*. At least in this direction it might be reckoned that Harvey's discovery was capable of application to the treatment of disease. In 1652 Francesco Folli wrote: "I have read William Harvey's book which treats of the movement of the heart and of the blood. This reading with some ideas I had on the grafting of plants gave rise in my mind to the problem that, the circulation of the blood existing, it would be possible to perform the transfusion by means of which one would not only cure but rejuvenate and make robust" (quoted in Graham, 1953). Folli, however, made no attempt to put his ideas into practice. Pepys wrote of the experiments at the Royal Society in his diary (November 14, 1666): "Dr. Croone told me that at the meeting at Gresham College tonight there was a pretty experiment of the blood of one dog let out till he died into the body of another on one side, while all his own run out on the other side. The first died upon the place and the other very well and likely to do well. This did give rise to many pretty wishes, as of the blood of a quaker to be let into an Archbishop, and such like; but, as Dr. Croone says, may, if it takes, be of mighty use to man's health for the amending of bad blood by borrowing from a better body" (Pepys, 1900). No one realized, however, that the success of Lower's experiment was due to transfusion of blood from one animal to another of the same species. So perhaps it was as well that 150 years were to elapse before further and more successful experiments were tried by James Blundell. "In view of the complete ignorance of asepsis, or immunology and of the processes of coagulation, it is indeed fortunate that the pressure of administrative and ecclesiastical disfavour brought about a cessation of further attempt at human transfusion. While the motives and methods of the opponents to transfusion are not above criticism, their effects were of service in postponing further experimentation until the advance of scientific knowledge made conquest of some of the danger and difficulties possible" (Zimmerman and Howell, 1932).

It is, perhaps, pertinent to ask whether Harvey had any conception as to the possible relation between his discovery and the advance of medical treatment. Stimulated by the example of Riolan, Harvey had intended to publish his *Medical anatomy* or *Anatomy in its application to Medicine*. In it he proposed to "relate from the many dissections I have made of the bodies of persons diseased—worn out by serious and strange affections—how and in what way the internal organs were changed in their situation, size, structure, figure, consistency, and other sensible qualities, from their natural form and appearances. . . . For even as the dissection of healthy and well-constituted bodies contributes essentially to the advancement of philosophy and sound physiology, so does the inspection of diseased and cachectic subjects powerfully assist philosophical pathology" (Harvey, 1847).

An accurate knowledge of anatomical changes that take place in disease was of importance both for diagnosis and for treatment, but the man who created the science, who taught us to think anatomically of disease, was Morgagni, whose *De sedibus et causis morborum per anatomen indagatis* was published in 1761. Harvey refers on many occasions to his medical observations, but, like his medical anatomy, these too have been lost. In the seventeenth century the profession was literally ravaged by theories, schools, and systems; iatro-mechanics, iatro-chemistry, humoralism, the animism of Stahl, the vitalistic doctrines of Van Helmont and his followers. Moreover, if we may properly judge from the only surviving letter from his professional correspondence, concerned with directions for treating a lady "affected with a cholic passion of a hot and bilious nature" by blood-letting and purging, Harvey's practice showed no advance on theories obtaining at that time (Willis, 1878). If we may judge from Aubrey: "All his profession would allow him to be an excellent anatomist, but I never heard any that admired his therapeutic way. I knew several practitioners in this town [London] that would not have given 3d. for one of his bills; and that a man could hardly tell by one of his bills what he did aim at. He did not care for chemistry, and was wont to speak against them [*sic*] with undervalue" (Aubrey, 1813).

"In connection however with experimental medicine, it may be mentioned that in Harvey's *De generatione* of 1651 (Exerc. 57) a striking observation was recorded, which has been overlooked. Harvey related that he had occasionally pricked his hand with a clean needle and then rubbed the same needle in the 'teeth' of a spider and pricked the hand in another place; the skin pricked with the envenomed needle became red, hot and inflamed, and it collected and girded itself for a contest with the poison for its overthrow. No modern experimental pathologist need be reminded of the numerous problems connected with these few words! It came as a shock to find nothing of the same nature was experimentally investigated till the advent of bacteriology in the nineteenth century" (Bayon, 1938).

One of the eminent physicians of the eighteenth century was Richard Mead. He was born in 1673 into a highly intellectual family, his father being a very distinguished nonconformist clergyman. After a liberal education he went to Leyden, where he spent some considerable time. He was a contemporary of Boerhaave, with whom he maintained a lifelong friendship. Time does not permit us to go into details of Dr. Mead's career, but, to give you a general picture of his position in scientific and medical society, we can point out that he was elected a Fellow of the Royal Society in 1703, became a member of Council in 1706, and a Vice-President in 1707. He also occupied a very high position in the Royal College of Physicians, being Censor, Harveian Orator, and Elect, and in 1744 was chosen by the Elects as President but declined the honour. Despite this highly scientific background, if we turn to Richard Mead's published works we can see that he was still dominated by the old humoral pathology. The following quotations from Medical Precepts and Cautions indicates quite clearly that the lesson of Harvey had miscarried:

> "Of these [fluids] the principal is the blood, from which are derived the several humours subservient to the various uses and purposes of life; and in particular that subtle and remarkably elastick fluid, generated in the brain, and known by the name of animal spirits, the instrument of sense and motion which functions it never could be capable of executing, were it not contained in proper organs" (Mead, 1762).

Again a study of the writings of Boerhaave, who was by far the most prominent scientific physician in Europe at the time, indicate quite clearly that he had failed to discard the old Galenical concept of disease.

Whilst this ignoring of the practical side of Harvey's teaching is practically universal in the eighteenth and early nineteenth century, one can point to a few published works that indicate that their authors had at least profited by the labours of Harvey. Giovanni Lancisi, 1654–1720, very clearly had an excellent concept of the circulation and was able to develop what is really the basis of modern cardiac pathology. Another physician of the late seventeenth and early eighteenth century, Vieussens, described a number of cases with valvular disease of the heart almost certainly due to syphilis. Whilst Vieussens was given to more airy speculation than Lancisi, a study of his papers does bring a refreshing modern touch, and it is quite clear that he understood the mechanics of the condition, this being possible only if one had a full grasp of the Harveian doctrine.

It would be possible to go on almost indefinitely quoting examples of the lack of understanding of the physiological principles in the seventeenth and eighteenth century, and for every single case for understanding such as those two just quoted there would be certainly many on the other side. We therefore must accept that Harvey's teaching failed for certainly a century and a half to rid medicine, and particularly therapeutics, of the mediaeval rubbish.

Tyranny of the False Doctrine

It is interesting to look at other sciences to see if we can find a parallel to this tyranny of a false doctrine. If we look at chemistry we find that it was clouded with a whole series of false doctrines, but they did not persist for the same length of time as the Galenical work did in medicine. One of the greatest bars to progress in chemistry was the famous phlogiston theory. This was introduced by Stahl and persisted for nearly 100 years, being finally disposed of by Black and Lavoisier at the end of the eighteenth century. Until this unnatural theory had been got rid of it was absolutely impossible to have any progress in chemistry, since the whole mechanism of oxidation, one of the most vital processes, could not be understood. Nearer to our times there was the great controversy on chemical formulae. Up to the middle of the last century organic compounds were analysed for their elementary composition—say, carbon, nitrogen, hydrogen, oxygen, sulphur, and so forth—and the molecular formula was simply calculated on the basis of the atomic weight of the individual atoms. This gave a formula which indicated that the compounds contained so many atoms of carbon, so many of hydrogen, so many of nitrogen, and so forth, but gave no idea at all as to their grouping. Many of the great organic chemists maintained that it was impossible ever to tell the grouping of the elements and that the atoms were probably arranged in molecules and held together by some kind of chemical affinity possibly in a state of violent agitation. In its way this was just as serious a bar

to progress as the humoral theory was to medicine, because until one could get a concept of the spatial distribution of the atoms modern synthetic organic chemistry could not be born. The actual modern system of recording chemical formulae was not thrashed out until the latter half of the last century, and the names of Kekulé, Cooper, Van Hoff, and Le Bel introduced the kind of formula that we are dealing with to-day. It is interesting to know that the chemical bars to progress were got rid of more quickly than those in medicine, the reason probably being that the subject of chemistry is much more easily subjected to direct experimental approach, whereas in medicine only years of clinical experience can really test a new theory or displace an old one.

Let us turn now to the title of this lecture: "A Riddle of the Seventeenth Century." The *Shorter Oxford Dictionary* describes a riddle as follows: "A question or statement intentionally worded in a dark or puzzling manner, and propounded in order that it may be guessed or answered." I trust I have avoided presenting my riddle in a dark manner, though I must confess that I cannot escape the accusation of puzzling. Why was it that this brilliant group of men to whom I have referred failed in the years following Harvey's death to apply the science that had developed at their time to therapeutics? What was the curious lack of association between the Royal Society and the Royal College of Physicians due to? I have quoted Dr. Keevil's remarks about Hamey, and it seems difficult to believe that Hamey, despite his great influence, could have influenced the College to such an extent that no reference at all appears to the Royal Society in the annals. A study of Hamey's life showed that he retired from London to Cheltenham in 1665, and that from then onwards he had only very sporadic connexions with the College. He died in 1676.

The Royal Society was founded and incorporated in the year 1660, and we are now approaching the tercentenary celebrations. Many founding members of the Royal Society were members of the College, and a number of them were high officers of the College. For example, the first Harveian Librarian, Christopher Merrett, was a founding member. Those who are familiar with descriptions of the early meetings of the Royal Society will remember the enthusiasm with which the early Fellows disproved the myths of science that had clouded knowledge in the past, and yet these men, the very medical Fellows who were taking part in them, still continued in their extraordinary mediaeval practice.

Looking back from the present century, one can see that reasonable therapeutics must rest on a tripod; one leg being a knowledge of the circulation, a second a knowledge of the infective nature of most diseases, and the final leg an adequate variety of powerful drugs. The seventeenth and eighteenth centuries lacked the last two legs, and it is therefore perhaps not surprising that physicians continued with their old practices. Again, as we have already pointed out, the seventeenth and eighteenth centuries were characterized by a flood of new theories indicating that physicians were constantly trying to get something more plausible than the Galenical doctrines.

If we look at the therapy of this century before the advent of the sulphonamides and antibiotics, many of the practices look little less foolish than those to which we have referred. This may be the answer to the riddle, though it still seems strange that they should go on with the weird practices. There is one passage in the *De motu cordis* which seems to indicate that Harvey did have some perception of the revolutionary nature of his discovery, and I propose to conclude in no better way than quoting from him:

"When I finally reckon up the number of questions that can be settled, doubts resolved, and obscure places made clear, given this illuminating truth, in every part of medicine (physiology, pathology, semeiotics, therapeutics), I find a field of such vast extent that, if I explored it fully in all directions, not only would this treatise of mine turn, contrary to my plan, into a full-sized book, but the rest of my life would perhaps not suffice for my writing of it" (Harvey, 1958, p. 96).

It is a pleasure to acknowledge the help received from my friend, the Librarian of the Royal College of Physicians, Mr. L. M. Payne. I am grateful to the President of the Royal College of Physicians for the facilities of the Library.

REFERENCES

Aubrey, J. (1813). *Letters Written by Eminent Persons . . . and Lives of Eminent Men, etc.*, **2**, pt. 2, p. 385. Longman, London.
Bayon, H. P. (1938). *Ann. Sci.*, **3**, 69.
Goodall, C. (*c.* 1680–1700). *A collection of College Affaires left by Dr. Goodall to the College of Physitians, London*, p. 335 (MS.).
Graham, J. M. (1953). *Edinb. med. J.*, **60**, 70.
Harvey, W. (1847). *Works*; trans. by R. Willis, p. 89–90. Sydenham Society, London.
—— (1958). *Movement of the Heart and Blood in Animals*, translated by K. Franklin. Blackwell Scientific Publications, Oxford.
Holinshed, R. (1808). *Chronicles*, vol. 4, p. 499. London.
Keevil, J. J. (1953). *The Stranger's Son*, p. 138–9. Geoffrey Bles, London.
Mead, R. (1762). *Medical Works*, p. 445–6. C. Hitch, etc., London.
Osler, Sir W. (1908). *Thomas Linacre*, p. 43. Cambridge University Press.
Payne, J. F. (1897). *Harvey and Galen* (Harveian Oration, 1896), p. 8. Henry Frowde, London.
Pepys, S. (1900). *Diary*; translated by H. B. Wheatley, vol. 6, pp. 63–64. George Bell, London.
Rolleston, Sir H. D. (1932). *The Cambridge Medical School*. Cambridge University Press.
Singer, C. (1954). *Brit. med. J.*, **2**, 1502.
Sydenham, T. (1848). *Works*: translated by R. G. Latham, 2 vols. Sydenham Society, London.
Topley, W. W. C. (1940). *Authority, Observation and Experiment in Medicine*, p. 10. Cambridge University Press.
Willis, R. (1878). *William Harvey*, p. 297. Kegan Paul, London.
Zimmerman, L. M., and Howell, K. M. (1932). *Ann. med. Hist.*, n.s. **4**, 420.

A plan for dealing with large-scale accidents or disasters devised last year by Dr. JAMES FAIRLEY, senior administrative medical officer of the South-east Metropolitan Regional Hospital Board, was tested in February by the exercise "Cascade." The site of the mock disaster was St. Olave's Grammar School for Boys in South-east London, and at least 170 "casualties" took part. Summing up at the "post mortem" after the exercise, Dr. Fairley said that local disaster plans must exist and be constantly reviewed. The board's overall plan had proved to be workable, but the closest collaboration between police, fire, ambulance, and hospital services was necessary, and the role of communications was obviously vital. The senior medical officer at the site must be easily identifiable by day or night, and he and the senior ambulance officer must work in close collaboration. A glossary of inter-service terms should be prepared so that all four services used the same terminology, and the Metropolitan police should decide what particulars were to be obtained from casualties. The hospital alerted first should be known as the "designated hospital," which would automatically provide the senior medical officer.

ASSESSMENT OF CORRELATION BETWEEN CERTAIN IN VITRO POLIOVIRUS MARKERS AND MONKEY NEUROVIRULENCE

BY

VICTOR J. CABASSO, Sc.D.; ERWIN L. JUNGHERR, D.V.M.; SEYMOUR LEVINE, Ph.D.; ARDEN W. MOYER, Ph.D.; MANUEL ROCA-GARCIA, M.D.; and HERALD R. COX, Sc.D.

From the Viral and Rickettsial Research Section, Lederle Laboratories, American Cyanamid Co., Pearl River, N.Y.

The availability of proved and stable laboratory assays other than the monkey test for determining the degree of virulence of polioviruses would indeed be of great value. Search for such assays has uncovered in recent years certain *in-vitro* characteristics, the so-called d, t, and MS "markers," which have been proposed as criteria of acceptability of poliovirus strains intended as live oral vaccines (Advisory Committee to the Surgeon-General, 1959). But already evidence suggests that at least the d marker is not as well correlated with monkey neurovirulence as was originally thought, and information accumulated about the MS character is as yet insufficient. Consequently, until the value of these markers is definitely established, the residual neurovirulence of a poliovirus strain for monkeys remains its most reliable marker and the most acceptable measure of its attenuation.

It is the purpose of this communication to present results of monkey tests on recent lots of Lederle oral poliovirus vaccine, to examine the degree of correlation between the findings and the "marker" pattern of the vaccine strains, and to discuss the relative validity of these *in-vitro* characters.

Results of Recent Monkey Tests on Lederle Oral Poliovirus Vaccine

As all known poliovirus vaccine strains have some degree of neuroactivity in monkeys when inoculated intraspinally, the present discussion of Lederle virus strains will be limited to results of intracerebral inoculation. Detailed monkey-test results have been reported (Cabasso *et al.*, 1960) on 8 type I, 11 type II, and 11 type III vaccine lots. The histological examination, however, was limited in these tests to the cervical and lumbar enlargements of the cord, as brains were not removed from inoculated animals.

With recent vaccine lots, the animals were submitted to a more complete histological scrutiny. The brain stem was dissected into three portions at approximate levels of the red nucleus and the abducens and hypoglossus nerves; the thalamus was examined for inoculation trauma. Only animals with a definite track in the thalamus were considered valid. The three portions of the brain stem—the thalamus and pre- and post-central gyri—as well as the upper, middle, and lower segments of the cervical and lumbar enlargements, were embedded in paraffin, orientation being maintained by ink marks.

In all, 41 sections per monkey were stained by the gallocyanin method and examined. Lesions were estimated according to Melnick's system (Melnick and Brennan, 1959) on a scale of + to + + + +. Although this system permitted immediate appraisal of lesions regarding location, distribution, severity, and relation to needle track, a formula was still required to evaluate relative neurovirulence among vaccine lots. Such a formula would allow detection of any undue changes when successive lots of vaccine are produced from the same or different seed virus. Accordingly, criteria were established which were based primarily upon spread or extension of lesions from site of inoculation. These were expressed in grades 1 to 4 as shown in Table I.

TABLE I.—*Formula for Evaluation of Relative Monkey Neurovirulence, or Degrees Thereof, After Intracerebral Inoculation*

Grade	Criteria
0	No lesions or track lesion with local inflammatory reaction
1	Significant inflammatory and neuronal changes homolateral to track
2	Lesions in brain stem
3	Lesions in brain stem and spread to cervical or lumbar cord
4	Spread to all portions of the C.N.S.

Grade 0 was assigned to no lesions or to track lesions with local inflammatory reactions; 1 to significant inflammatory and neuronal changes homolateral to the track; 2 to lesions in brain stem; 3 to spread to cervical or lumbar cord; and grade 4 to spread to all portions of the central nervous system.

In the final evaluation of results, grades 1 and 2, which symbolized little or no spread from the site of inoculation, were considered not significant, and the relative neurovirulence of a vaccine lot was expressed as the sum of the percentage of animals showing grades 3 and 4. By this grading system it was found that, in consecutive lots involving the examination of a total of 574 monkeys, the average incidence of combined grades 3 and 4 was 21% for type I, 57% for type II, and 16% for type III. Thus, a baseline of normally expected neurovirulence for each type of Lederle poliovirus was established as a reference for recognizing a vaccine lot with increased activity in monkeys.

As summarized in Table II, 4 out of 12 tests performed on 10 type I lots of vaccines, three of seven tests on

TABLE II.—*Paralytic Rates and Degrees of Histological Lesions of Lederle Strains of Poliovirus Vaccine in Successive Lots*

	Test No.												Av.
	1	2	3	4	5	6	7	8	9	10	11	12	
Type I:													
Paralytic rate (%) ..	13	[0	13]	0	0	0	[44	0]	0	0	0	15	8
Histol. lesions (%)	**32**	[5	21]	0	10	10	[**50**	10]	6	13	**26**	**50**	21
Type II:													
Paralytic rate (%) ..	0	0	0	0	[0	5]	13						2
Histol. lesions (%)	45	54	30	**70**	[53	**85**]	**65**						57
Type III:													
Paralytic rate (%) ..	[0	0]	0	0	27	0	10	0	29	0			6
Histol. lesions (%)	[5	**50**]	0	0	**36**	16	**25**	**20**	**20**	0			16

Bold figures denote pools showing above-average neurovirulence. Brackets indicate results of duplicate tests on the same vaccine lot.

six type II lots, and five of ten tests on five type III lots were above average. It must be emphasized, however, that the animals were inoculated with very large doses of virus (from over 10^5 to over 10^7 TCD_{50}); that most reactions occurred at 10^7 and 10^6 levels except for type II virus; and that the paralyses or weaknesses observed were non-progressive and non-fatal. In contrast, with much smaller doses of virulent polioviruses, sometimes less than 10 TCD_{50}, close to 100% of animals not only showed severe histopathological changes but also developed progressive paralysis and died of the disease 5 to 10 days after inoculation.

Some variation was observed between two consecutive tests with the same lot of vaccine (Table II). For example, type I tests Nos. 2 and 3 were obtained at two different times on the same lot of virus, as were tests Nos. 7 and 8 on another lot. Similarly, type II, Nos. 5 and 6, and type III, Nos. 1 and 2, results were also obtained in duplicate tests on the same materials. No ready explanation can be advanced for these seeming discrepancies except that the physical condition of the monkeys in the different tests varied substantially.

The type II Lederle vaccine strain has always shown greater intracerebral activity in monkeys than the other two types. It must be emphasized again, however, that this activity manifests itself only in histopathological changes and not in paralysis or other clinical signs in the animals. It might well be that this particular type II strain owes its neuronophilic characteristic to its long intracerebral-passage history in mice and suckling hamsters (Moyer *et al.*, 1952; Roca-Garcia *et al.*, 1952; Cabasso *et al.*, 1952, 1954), and that in this respect it may be compared to the 17 D yellow-fever vaccine strain (Strode, 1951).

Paradoxically, however, this same type II virus seems to possess most of the other laboratory characteristics currently attributed to avirulent polioviruses as well as the lowest infectivity for the human intestinal tract. Of the three Lederle vaccine strains it is, as is indicated later, the one with the most favourable "marker" picture. It is also the one which results in the lowest conversion rates from seronegative to seropositive (65 to 75% in most instances as compared with 85 to 95% for types I and III). Furthermore, it has consistently shown the least spread from vaccines to either contact siblings or the community and, unlike Lederle types I and III strains, type II virus recovered from either vaccinees or their contacts has caused no paralysis in monkeys after intracerebral inoculation of stool suspensions containing up to $10^{5.3}$ TCD_{50}/ml.

In-vitro Marker Characterization of Lederle Poliovirus Vaccine Strains

The d, t, and MS characters of Lederle poliovirus strains in relation to their residual monkey neurovirulence are shown in Table III. The MS character was obtained by the tube-titration method rather than by efficiency of plating, and ratings of the three markers were made by criteria described by Melnick *et al.* (1959) and Kanda and Melnick (1959). All three viruses possessed the t− character, but they differed in their d and MS markers; these were d+ MS± for type I, d± MS− for type II, and d+ MS+ for type III. Type II virus, which has consistently produced the most histological change in monkeys, has a marker pattern most like that suggested for avirulent polioviruses.

Pertinent questions at this time are how truly representative of avirulence these markers are, and how stable they may be in relation to monkey neurovirulence. Correlation between these characters and monkey neurovirulence was initially established by the use of known attenuated and virulent poliovirus strains, but whether these characteristics were inevitable accessories of avirulence in all polioviruses, or only characteristic of the particular attenuated strains studied, with incidental or no relation to avirulence, remains to be determined. Obviously this aspect of markers can be evaluated only through extensive investigation of a whole range of natural and laboratory-induced poliovirus variants.

A discrepancy connected with the d marker was already apparent in the original published report on this character (Vogt *et al.*, 1957); type I SM 90 strain, which was judged attenuated by the neurovirulence test, possessed the d+ character associated with the more virulent strains used in the same study. Similarly, Hsiung and Melnick (1958), working with natural poliovirus isolates, or with viruses recovered from persons fed avirulent virus, found several d+ strains which were classified as attenuated by the monkey test. Furthermore, Sabin (1959) has reported that a laboratory-induced d+ variant of his type I vaccine strain remained as avirulent for monkeys as was the original d variant. More recently Yoshioka *et al.* (1959), in a study of polioviruses excreted by children fed Sabin's type I vaccine strain, or those isolated from flies trapped in the trial area, found that the d marker was not always in agreement with results of the monkey virulence tests.

A systematic study of the effect that induced variation of the d and t characters may have on the monkey virulence of an attenuated d− t− poliovirus was undertaken in our laboratory with the original Ls-c type I virus, for which we are indebted to Dr. Morris Schaeffer. The history of the virus sample received is summarized in Table IV.

In Dr. Schaeffer's laboratory the virulent Mahoney strain was successively passed 14 times intracerebrally in monkeys, twice in monkey-testis-tissue culture, six times in monkey skin graft in chicken embryos, 34 times in monkey testis, 11 times in monkey

TABLE III.—*"Marker" Characterization of Lederle Poliovirus Vaccine Strains in Relation to Their Residual Monkey Neurovirulence*

Virus Type	Marker			Degree of Intracerebral Neurovirulence (%)
	d	t	MS*	
I ..	+	−	±	21
II ..	±	−	−	57
III ..	+	−	+	16

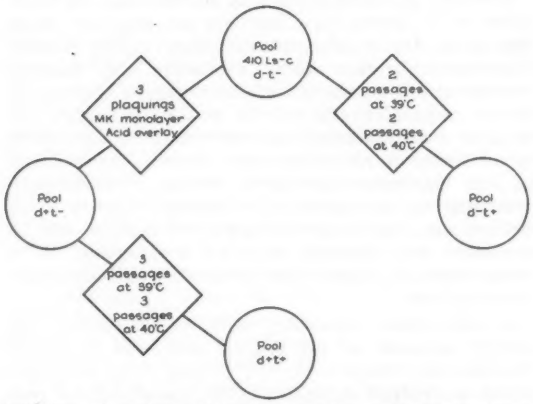
* MS values were obtained by tube-titration method rather than efficiency of plating.

TABLE IV.—*History of Type I Ls-c Virus Obtained from Dr. Schaeffer*

Schaeffer's Lab.:
- Mahoney strain (vir.) → 14 Monkey passages (Ic)
- 2 Monkey testis passages
- 6 Monkey skin graft in chick embryos
- 34 Monkey testis passages → 11 Monkey skin passages
- 13 Monkey kidney passages

Lederle Lab.:
- 4 Consecutive plaquings in monkey kidney monolayers
- Pool 410 Ls-c progeny of 4th plaquing used in present study (d− t−)

skin, and, finally, 13 times in monkey-kidney-tissue culture. Upon receipt in our laboratory the 13th monkey-kidney-tissue culture passage was plaqued four consecutive times on monkey-kidney monolayers by the Dulbecco method (Dulbecco and Vogt, 1954); pool 410 Ls-c, used in this study, represented the progeny of the fourth plaquing. This pool clearly possessed the d−t− characters. Starting with pool 410, variants of various marker combinations were induced as indicated in the Diagram. A d+t− pool



Induction of variants of various marker combinations from d−t− Schaeffer's Ls-c type I poliovirus.

was obtained after three plaquings in monkey-kidney-tissue culture under low bicarbonate overlay. Three terminal dilution passages in monkey-kidney-tube cultures at 39° C., followed by three similar passages at 40° C., yielded a d+t+ variant from the d+t− pool. Finally, the d−t+ variant came directly from the d−t− pool, after successive passages, twice at 39° C. and twice more at 40° C. by the terminal dilution method.

Table V summarizes the results obtained by virulence tests in monkeys with the four pools of virus as well as the effect which variation of the d and t markers had on the MS marker. It can be observed that, so long as the t− marker remained unchanged, varying d− to d+ did not induce any change in the virulence of the virus for monkeys; no paralysis followed intramuscular or intracerebral inoculation of either d−t− or d+t− variants, and histological lesions were only of grades 1 or 2 as defined earlier.

In contrast, changing the t− character to t+ was accompanied by reappearance of monkey virulence by both intramuscular and intracerebral routes. Similarly, histological lesions were more intense.

TABLE V.—*Monkey Test Results and MS Character of Various d and t Variants of Schaeffer's d−t− Ls-c Type I Poliovirus*

	Variant			
	d− t−	d+ t−	d− t+	d+ t+
TCD_{50}/ml. ..	7·5	7·5	6·5	7·5
MS character ..	MS−	MS−	MS−	MS−
Paralytic ratio:				
I.M., und. ..	0/4	0/4	3/4	5/5
I.C., und. ..	0/4	0/4	2/4	3/3
I.C. 10^{-1}	0/4	0/4	2/4	4/4
Histol. ratio:				
I.M., und. ..	3/4*	1/4*	3/4	5/5
I.C., und. ..	0/4	2/4*	4/4	3/3
I.C. 10^{-1} ..	0/4	3/4*	4/4	4/4

* Lumbar lesions only.

Variation of either the d or t characters had no effect on the MS marker, which remained unchanged in all three induced variants.

Thus, in confirmation of the findings of others, it appears that the presence of a d+ marker in a poliovirus strain is not necessarily synonymous with virulence for monkeys.

As regards the t marker, however, the finding by Lwoff and Lwoff (1959), that selection of t+ variants from an originally t− strain was accompanied by reappearance of monkey virulence, implied a closer correlation between the t marker and neurovirulence than is the case for the d character. Our results support this implication. It may be, as intimated by Lwoff and Lwoff, that this correlation is due to the relative multiplication rates of "cold" or "hot" virus variants within the central nervous system of the monkey, whose normal body temperature varies between 39° and 40° C. In this regard, it may be interesting to speculate on what the results might be if Pasteur's classic experimental method with anthrax in chickens were applied to an avirulent t− poliovirus strain in monkeys. Would the behaviour of the virus remain the same in an animal whose body temperature was lowered to that optimal for virus multiplication? Be that as it may, as yet insufficient investigation of field isolates has been reported to be sure that a t+ character is invariably associated with neurovirulence, and some exceptions have already been pointed out. For example, a mouse-selected derivative of type II MEF_1 virus which lost its neurovirulence for monkeys was shown by Sabin (1959) to be still capable of growing readily at 39° and 40° C., perhaps even better than a fully virulent type I Mahoney strain. Also, in at least one instance a d+t+ type I isolate from children fed Sabin's Ls-c strain was found by Yoshioka *et al.* (1959) to be still avirulent for monkeys by the intracerebral route. On the other hand, Melnick and Benyesh-Melnick (1960), studying viruses excreted by children vaccinated with Sabin's strain of virus, obtained evidence that excreted virus which became of increased neurovirulence for monkeys could still retain the t− character.

Information available on the MS marker is based primarily upon laboratory studies with a limited number of strains, and little can be said at this time about its correlation wtih monkey virulence. However, it should be pointed out that in the original study by Kanda and Melnick (1959) the correlation did not hold for a virulent type III strain (Saukett) which possessed an MS instead of the MS+ character.

It would be of interest to study induced MS+ variants from known attenuated MS strains to determine whether associated changes occur in their monkey virulence or other markers. Such an attempt is now in progress.

Discussion

No one questions the necessity for thorough laboratory testing of poliovirus strains intended for use in human immunization, by methods which genuinely portray the safety of these strains. But it should be stressed at this point that, in considering the acceptance of a vaccine strain, the laboratory criteria employed must be consonant with the behaviour of the strain in the ultimate host, and that laboratory and field findings supplement one another in the characterization of the agent. For example, 17 D yellow-fever virus has a long history of proved safety in man, although

still capable of paralysing and killing up to 20% of monkeys inoculated intracerebrally, and of provoking central-nervous-system changes in the rest.

No doubt the d, t, and MS markers do represent useful investigational tools of polioviruses. But it is important to recognize our ignorance concerning the basic mechanisms involved in neurovirulence and the degree to which these various markers reflect this mechanism. The correlation of these markers with neuroactivity is imperfect, indicating that other and unknown factors also play a part in neurovirulence. This is in all probability to be expected, since the growth of a virus within a cell is dependent not only upon the environmental conditions outside the cell, as *p*H and temperature, but also upon the presence of proper receptors on the cell surface and perhaps an entire battery of as yet unknown enzymes necessary for initiating and carrying out the complex operation of virus synthesis and release. It seems, therefore, that at this stage of our knowledge one is hardly justified in considering as indicators of avirulence unstable secondary characteristics of as yet unproved significance, when the direct method of assay in monkeys is readily available and accords well with the field behaviour of the strains in the human host.

Summary

Baselines of normally expected neuroactivity for each type of Lederle attenuated polioviruses in consecutive lots of vaccine were established by grading on a scale of 1 to 4 the spread of lesions from the site of inoculation in 574 monkeys inoculated intracerebrally with consecutive lots of vaccine. Relative neuroactivity of a vaccine lot was expressed as the sum of the percentage of animals showing grades 3 and 4.

The average incidence of combined grades 3 and 4 was 21% for type I, 57% for type II, and 16% for type III virus. The greater intracerebral activity of type II virus, which expresses itself in histopathological lesions and not in paralysis, is in marked contrast to its clinical behaviour in man, where it shows the least "aggressiveness" of the three poliovirus strains, and to its marker pattern, which conforms most closely to the one proposed for avirulence.

All three Lederle poliovirus strains possess the t− character, which appears to have the best correlation with monkey avirulence, but differ in their d and MS markers; type I was found to be d+MS±; type II was d±MS−; and type III was d+MS+. Some of the discrepancies in the correlation between markers and monkey virulence are discussed.

Since the value of d, t, and MS markers as criteria of attenuation for polio vaccine viruses has not been definitely established, residual neurovirulence for monkeys remains the most acceptable measure of strain attenuation.

REFERENCES

Advisory Committee to the Surgeon-General (1959). Public Health Service. 2nd Report of the Committee on Live Poliovirus Vaccine.

Cabasso, V. J., Jervis, G. A., Moyer, A. W., Roca-Garcia, M., Orsi, E. V., and Cox, H. R. (1960). *Brit. med. J.*, **1**, 373.

—— Stebbins, M. R., and Cox, H. R. (1954). *Proc. Soc. exp. Biol. (N.Y.)*, **85**, 167.

—— —— Dutcher, R. M., Moyer, A. W., and Cox, H. R. (1952). Ibid., **81**, 525.

Dulbecco, R., and Vogt, M. (1954). *J. exp. Med.*, **99**, 167.

Hsiung, G. D., and Melnick, J. L. (1958). *J. Immunol.*, **80**, 282.

Kanda, Y., and Melnick, J. L. (1959). *J. exp. Med.*, **109**, 9.

Lwoff, A., and Lwoff, M. (1959). *C.R. Acad. Sci. (Paris)*, **248**, 154.

Melnick, J. L., and Benyesh-Melnick, M. (1960). *Fed. Proc.*, **19**, 407.

—— —— and Brennan, J. C. (1959). *J. Amer. med. Ass.*, **171**, 1165.

—— and Brennan, J. C. (1959). First International Conference on Live Poliovirus Vaccines, June 22–26, 1959, pp. 65–101. Pan American Sanitary Bureau Sci. Pub., No. 44.

Moyer, A. W., Accorti, C., and Cox, H. R. (1952). *Proc. Soc. exp. Biol. (N.Y.)*, **81**, 513.

Roca-Garcia, M., Moyer, A. W., and Cox, H. R. (1952). Ibid., **81**, 519.

Sabin, A. B. (1959). First International Conference on Live Poliovirus Vaccines, June 22–26, 1959, pp. 14–33. Pan American Sanitary Bureau Sci. Pub., No. 44.

Strode, G. K. (1951). *Yellow Fever*. McGraw-Hill, New York.

Vogt, M., Dulbecco, R., and Wenner, H. A. (1957). *Virology*, **4**, 141.

Yoshioka, I., Riordan, J. T., and Horstmann, D. M. (1959). *Proc. Soc. exp. Biol. (N.Y.)*, **102**, 342.

VENTRICULAR FIBRILLATION DURING LEFT ATRIAL PUNCTURE

RECOVERY AFTER EMERGENCY MITRAL VALVOTOMY

BY

C. BISHOP, M.B., B.S., D.A.

M. HONEY, M.B., M.R.C.P.

AND

D. G. TAYLOR, M.B., F.R.C.S.

From the Anaesthetic, Cardiac, and Thoracic Surgical Departments, Guy's Hospital, London

The technique of percutaneous left atrial puncture introduced by Björk *et al.* (1953) has been widely used in the investigation of mitral valve disease and is a routine method at this hospital (Hancock, 1959a). The case reported here developed ventricular fibrillation during the puncture. Immediate cardiac massage was followed by mitral valvotomy and the patient ultimately made a complete recovery.

Case Report

A married woman aged 37, who gave no rheumatic history, complained of increasing breathlessness on exertion since her first pregnancy five years ago, when mitral stenosis was diagnosed. She had had attacks of bronchitis during the previous three winters, with haemoptyses on the last occasion.

On examination the pulse was regular and there were the physical signs of mitral stenosis, with a soft early diastolic murmur at the lower left sternal border, attributed to slight aortic incompetence. The blood-pressure was 110/60. There was no evidence of systemic or pulmonary venous congestion.

A chest radiograph showed no cardiac enlargement, pulmonary venous congestion, or interlobular septal lines. Screening showed slight left atrial and right ventricular enlargement. An electrocardiogram showed *P* mitrale, slight right axis deviation, and right ventricular hypertrophy.

Left atrial puncture was undertaken to assess the severity of the mitral stenosis, as doubts existed whether the symptoms were due to the valve lesion or to pulmonary disease.

Left Atrial Puncture

Premedication: papaveretum ¼ gr. (20 mg.), hyoscine 1/150 gr. (0.43 mg.). Local analgesia with 2% lignocaine (without adrenaline). A No. 16 thin-walled cannula with

inner needle was introduced 4 cm. to the right of the midline in the ninth intercostal space, with the patient prone, and advanced without difficulty into the left atrium (Hancock, 1959a). After left atrial pressure had been recorded, a fine "polythene" catheter was passed through the cannula into the left atrium and ventricle; two records during withdrawal through the mitral valve were obtained (Fig. 1). At the time, the gradient (observed on the oscilloscope monitor) was noted to be small and of doubtful significance. The pressures were L.A. c 34, x 29, v 39, y 25 (mean 30) and L.V. 110/29; the mean diastolic gradients on the two withdrawals were 0 and 6 mm. Hg.

After these pressure records had been made, the patient complained of pain across the lower chest, felt ill, and vomited; the E.C.G. monitor showed sinus arrest and an idioventricular rhythm (rate 45–60) with a broad Q.R.S. (0.18 sec.) (Fig. 2 A and B). Ordinarily, a dye-dilution curve for estimation of cardiac output and assessment of mitral incompetence (Hancock, 1959b) would have been performed at this stage. On this occasion the needle was promptly removed and the patient turned into the supine position. She vomited again, and the E.C.G. now showed coarse ventricular fibrillation (Fig. 2 C).

An immediate left thoracotomy was performed and cardiac massage begun through the intact pericardium; oxygen was administered by facepiece, using a Boyle anaesthetic apparatus. A thoracic surgeon and an anaesthetist arrived within five minutes of the onset of cardiac arrest. The surgeon opened the pericardium and began direct cardiac massage; there was no evidence of intrapericardial bleeding. An endotracheal tube was introduced and manual inflation of the lungs with oxygen continued.

A good carotid pulse was palpable during massage, and the myocardial tone was good. In spite of numerous (approximately 12) attempts at electrical defibrillation (150–200 v.) and intra-atrial injections of 1:10,000 adrenaline and 1% calcium chloride, ventricular fibrillation continued for 30 minutes, after which time co-ordinate ventricular contraction was restored. At this stage it was necessary to administer 15 mg. of D-tubocurarine intravenously to control voluntary respiratory efforts; anaesthesia was continued with 50% nitrous oxide and oxygen.

It was then felt that the patient stood little chance of survival if severe mitral stenosis were left unrelieved. In spite of the evidence already obtained of little or no significant stenosis, the mitral valve was then explored digitally through the left atrial appendage. Tight mitral stenosis (0.75–1 by 0.5 cm.) was found, without calcification or regurgitation. The medial commissure was split to the ring, and the lateral commissure also split well but not completely. Partially fused chordae and papillary muscles beneath the valve cusps formed a funnel-like subvalvar stenosis; some separation of the chordae was achieved and a final functional orifice of 3.5 cm. obtained. Ventricular fibrillation recurred, but this responded to a single shock and sinus rhythm returned (P–R interval 0.2 sec., QRS duration 0.16 sec.) (Fig. 2 D and E).

After restoration of sinus rhythm the systemic blood-pressure was unrecordable, but by aortic palpation was within the range of 40 to 50 mm. Hg. The circulation was accordingly assisted by intermittent cardiac massage for approximately 10 minutes, and over this period the systolic pressure gradually rose to 80 mm. Hg. The numerous bleeding-points which had now become apparent were ligated and the chest wall was closed with underwater-seal pleural drainage. Though the patient was breathing spontaneously 1/75 gr. (0.87 mg.) of atropine sulphate followed by 2.5 mg. of neostigmine was given in order to abolish any residual curarization. The pulse was very rapid (about 140 beats a minute) and digitalization was started by an intravenous injection of 1 mg. of digoxin. The patient was then transferred to the recovery ward and placed in an oxygen tent.

One hour later it was noted that respiration was fast and somewhat gasping. She was unconscious, with generalized flaccidity and pupils which did not react to light. The systolic blood-pressure was 70 mm. Hg, and the rectal temperature 37° C.

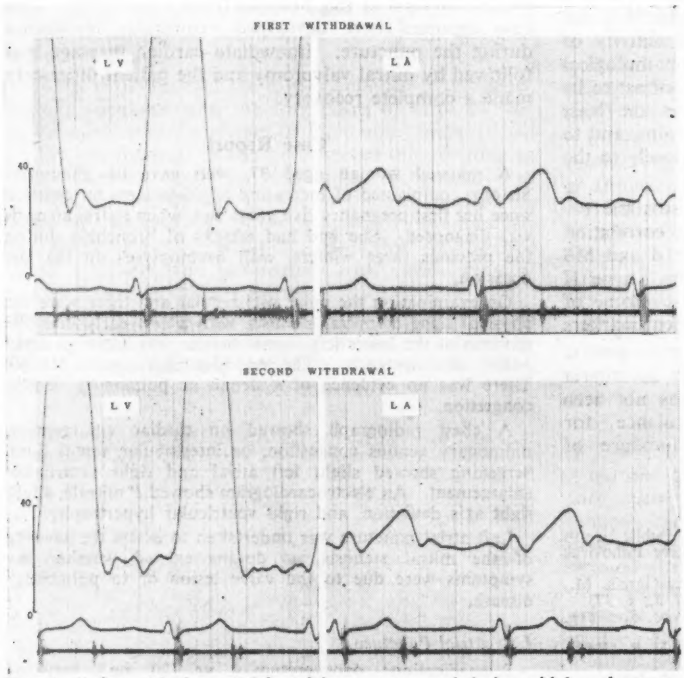


FIG. 1.—Left ventricular and left atrial pressure record during withdrawal across mitral valve. Above, first record showing no gradient; below, second record showing small diastolic gradient (mean 6 mm.).

The failure to recover consciousness, coupled with the neurological signs present three hours after closure of the thoracotomy, unquestionably pointed to anoxic cerebral damage of a severe degree. Treatment was based on two principles—namely, dehydration and hypothermia. Initially 100 ml. of triple-strength plasma was given rapidly and was followed 15 minutes later by a further 200 ml. Within minutes the limbs were moved spasmodically and she protested incoherently. Coincident with this was a faint pupillary response to light and a definite improvement in muscle tone. The improvement in the level of consciousness was maintained, and over a period of three hours a total of 500 ml. of the concentrated plasma was given. It is emphasized that during this period the systolic blood-pressure remained within the range of 80 to 90 mm. Hg. During this phase the body temperature was reduced rapidly by surface cooling to 33.5° C. and maintained at approximately that level for 30 hours. Shivering was controlled by intramuscular chlorpromazine, and analgesics were given as required.

Some 12 hours after starting this regime the patient was conscious, though disorientated in respect of time. There was a gradual improvement in the mental state, and before hypothermia was discontinued she was quite rational but emotionally labile and intensely depressed. This alteration in personality was noted by relatives. Some three weeks after opera-

tion she was aware of a sudden mental change, which is best related in her words as "an awakening as if from a bad dream" to revert to what she considered her normal bright and cheerful self. She complained of moving patterns in the lower half of the visual fields, but there was no actual loss of visual field. There was also some ataxia, giddiness, and weakness of the right arm. Apart from extensor plantar responses, little objective evidence of central nervous abnormality was discovered, but the neurologist (Dr. Ian Mackenzie) thought that there had been some anoxic brain damage, principally of basilar distribution.

On discharge from hospital seven weeks after emergency thoracotomy, her physical and mental capacity appeared to be completely normal.

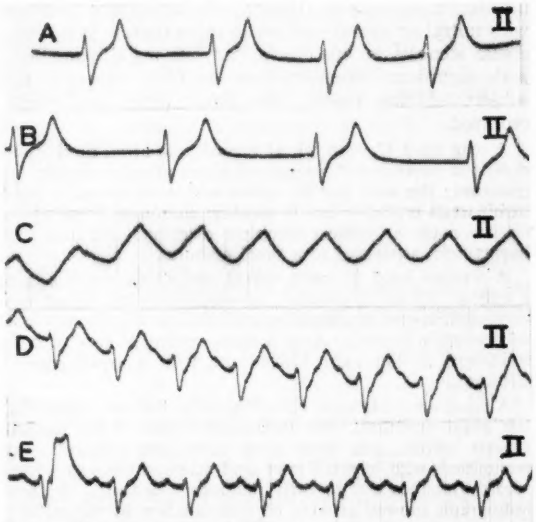


FIG. 2.—E.C.G. standard lead II. A, Immediately before withdrawal of needle. B, After withdrawal of needle. C, Onset of ventricular fibrillation. D, After mitral valvotomy. E, After closure of chest.

Discussion

Management of the Emergency

Experience with this patient emphasizes once again the crucial importance of opening the chest and starting cardiac massage immediately cardiac arrest has been diagnosed (Milstein, 1956). In this case the monitoring electrocardiogram left no doubt that ventricular fibrillation had occurred, but no time was wasted stimulating the heart mechanically, administering drugs, or awaiting assistance before embarking on thoracotomy.

It is also well established that a valve stenosis should be relieved before cardiac arrest can be overcome. That this is so when cardiac arrest occurs during the course of an operation on the heart, particularly for the relief of aortic stenosis, is perhaps more familiar than the sort of situation described in this paper. It was very striking that co-ordinate ventricular contraction was achieved with the utmost difficulty before the mitral valvotomy and with relative ease afterwards. There can be no doubt that her survival depended on the performance of mitral valvotomy as well as on the immediate institution of cardiac resuscitation when the emergency arose.

Management of the Post-operative Period

The principal effects of anoxic damage to the central nervous system are nerve-cell injury and the appearance of cerebral swelling. The mechanism, extent, and clinical significance of this latter process are not clear (White *et al.*, 1942; Edstrom and Essex, 1956), but the increase in brain volume is of serious significance (Atkinson, 1952). A rational if empirical method of treatment is therefore a reduction of brain volume. Hypothermia is of great value in that not only does it reduce cerebral metabolism and confer a degree of protection under anoxic conditions (Lougheed and Kahn, 1955; Brock and Ross, 1955), but it is also believed to produce a reduction in brain volume where there is established brain injury as reported by Lundberg *et al.* (1956) and Sedzimir and Dundee (1958). There is ample experimental and clinical evidence that hypothermia will result in a reduction of normal brain volume (Rosomoff and Holaday, 1954).

Rapid reduction of brain volume is achieved by intravenous hypertonic solutions. Concentrated solutions of dextrose, plasma, and more recently urea (Javid and Settlage, 1956) have been used for this purpose. We decided to use triple-strength plasma because it is locally non-irritant and at the same time undoubtedly efficient, as shown by the work of Maciver *et al.* (1958). Clinical experience with intravenous urea is not as yet extensive, and the concentrated sugar solutions, apart from the intense local irritation, may cause renal tubular damage (Lindberg *et al.*, 1939).

Interpretation of the Haemodynamic Findings

When the withdrawal records were obtained it was observed on the oscilloscope monitor that there appeared to be little or no diastolic gradient between left atrium and ventricle. It was concluded at the time that the mitral stenosis was mild, and this conclusion to some extent influenced the course of action later. Fortunately, however, the decision to explore was finally taken, since it was thought that the patient's chances of survival were slight if unrelieved severe mitral stenosis was present. It had been noticed during massage that filling of the left ventricle was impaired.

Subsequent study of the photographic pressure records (Fig. 1) showed that the mean diastolic gradient on the two withdrawals was 0 and 6 mm. Hg. In view of the surgical demonstration of severe stenosis, this requires explanation. If the 6-mm. gradient is regarded as a valid measurement, and the mitral valve area taken as 0.7 sq. cm. (surgical assessment), then the cardiac output at the time, calculated with a modified Gorlin formula,* was approximately 2.5 l./min. Though the patient's condition had not then given cause for worry, the electrocardiogram (Fig. 1) did show lengthening of the P–R interval (0.2–0.22 sec.) and QRS duration (0.1 sec.), and it may well be that the output of the heart had already fallen to this extent. It is more difficult to explain why the first withdrawal had shown no gradient. Scrutiny of the records shows that the difference between the two withdrawals was that the left ventricular diastolic pressure was higher in the former. A possible explanation is provided by the surgical observation of a funnel-like subvalvar stenosis produced by fused and shortened chordae. It is conceivable that the tip of the catheter lay below the mitral valve ring in the subvalvar zone; in systole the ventricular pressure was recorded, but in diastole the pressure was intermediate between atrial and ventricular. This explanation is not entirely satisfactory, but no better one can be put forward.

*M.V.A. (sq. cm.) $= \dfrac{\text{C.O. (l./min.)} \times 1{,}000}{45.5 \times \text{D.F.P. (sec./min.)} \times \sqrt{\text{mitral diastolic mean gradient}}}$

D.F.P. = diastolic filling period; C.O. = cardiac output; M.V.A. = mitral valve area. (D.F.P. and mitral gradient directly measured.)

It is important, however, to recognize that in severe mitral stenosis the gradient measured at left-heart catheterization may occasionally, under circumstances such as have been described here, be misleadingly low or even absent.

Risks of Left Atrial Puncture

Right posterior transthoracic left atrial puncture is now a well-established diagnostic procedure. It is recognized to have an appreciable morbidity and mortality, though the incidence of serious and fatal sequelae is small. Bougas (1957) collected 1,770 cases from the literature with a mortality of 0.5%, and Crymes *et al.* (1959) collected 2,178 cases with a mortality of 0.69%.

Some of the deaths reported have been in patients already seriously ill at the time of the procedure (Bougas *et al.*, 1956;† Bougas, 1957; Gadboys *et al.*, 1957; Fisher, 1959), and in these the procedure may have been merely a minor contributory factor. Other deaths have been due to pericardial tamponade or to surgical intervention for actual or supposed tamponade (Björk, 1954;‡ Blakemore *et al.*, 1957; Musser and Goldberg, 1957). Non-fatal haemopericardium, with or without tamponade, requiring aspiration has been reported in several series (Fisher, 1955, 1959; Lawrence, 1956; Blakemore *et al.*, 1957; Bagger *et al.*, 1957; Kavanagh-Gray and Drake, 1958); haemothorax has also been reported (Björk, 1954; Fisher, 1955; Bagger *et al.*, 1957; Samet *et al.*, 1959). In these cases a long and difficult puncture, the use of a heparinized drip for an associated right-heart catheterization, and the accidental puncture of a high-pressure chamber (usually aorta) have been recognized as important factors predisposing to haemorrhagic complications; Björk's (1954) case had an aneurysm of the ascending aorta which was punctured.

Proved or probable arterial emboli (Musser and Goldberg, 1957; Bosher, 1958; Samet *et al.*, 1959) have been responsible for deaths, and non-fatal emboli have also been reported (Bagger *et al.*, 1957; Kavanagh-Gray and Drake, 1958). Other important complications include pneumothorax, syncope, hypotension, and knotting, or "shearing off," of the plastic catheter used for entering the left ventricle.

It is generally believed that bronchoscopic puncture of the left atrium is a safer procedure, but deaths have been reported due to ventricular fibrillation associated with a reaction to local anaesthetic (Rubin and Shah, 1958), coma and asystole possibly due to a cerebral embolus (Crymes *et al.*, 1959), and convulsions on withdrawal of bronchoscope and needle (Davila *et al.*, 1958). Emboli may occur with this technique (Rubin and Shah, 1958), as also may knotting, or "shearing off," of the catheter or tamponade (Crymes *et al.*, 1959), though this appears to be very rare.

The occurrence of ventricular fibrillation during the left atrial puncture itself has been reported by Samet *et al.* (1959) and also by Björk in two cases in association with tamponade (Bagger *et al.*, 1957). One of Björk's cases had transient ventricular fibrillation and another had transient cardiac asystole immediately after angiocardiography with injection through the left atrial needle (Bagger *et al.*, 1957). Our patient developed ventricular fibrillation within a very short time of the removal of the needle and in the absence of significant bleeding into the pericardial sac.

At this hospital, early experience with left atrial puncture was unfortunate (Brock *et al.*, 1956), but this was due to the use of the technique in the assessment of advanced aortic stenosis, many of the patients being in left ventricular failure. The technique was therefore abandoned in favour of left ventricular puncture in aortic stenosis, but was adopted again in 1957 for the investigation of mitral valve disease and has been used routinely since then (Hancock, 1959a). Fifty patients have been investigated. Thirty-one are included in Hancock's series; there were two important complications in these cases—a mesenteric embolus and atrial fibrillation (Hancock, 1959a); 19 additional patients with mitral or mitral and aortic valve disease (mild lone aortic stenosis in one) have had left atrial punctures, with significant complications in four. One is the subject of this report, the other three are briefly reported.

A man aged 47, with mitral stenosis and atrial fibrillation, remained hypotensive for several hours after an uneventful puncture; the next day he awoke with aphasia and a right hemiparesis probably due to cerebral embolism, from which he has made an almost complete recovery. He also had haematuria, attributed to a renal embolus.

A woman aged 51, with mitral and aortic stenosis, had a difficult left atrial puncture, at which the right atrium was entered first, and moderate hypotension developed. She was subsequently found to have a fairly extensive area of consolidation in the right lower lobe with a small pleural effusion.

A man aged 31, with mitral stenosis, had an uneventful left atrial puncture. He discharged himself from hospital against advice, and four days after the puncture was readmitted with pleural pain and haemoptysis, and with severe dyspnoea due to early pulmonary oedema. A chest radiograph showed an area of consolidation in the axillary subsegments of the right upper lobe, which resolved quickly.

This last patient probably had a pulmonary infarct, but in the other patient with a pulmonary opacity this could have been related to the passage of the needle and may have represented an area of hamorrhagic consolidation. In both these patients heparinized saline had been infused, and in one the heparin was thought to have contributed to the development of this complication. Since that time heparin has not been used during left atrial puncture, even when right-heart catheterization has been undertaken simultaneously.

Thus there have been six significant complications in 50 cases (12%), but no deaths.

Summary

The case of a patient with mitral stenosis who developed ventricular fibrillation at left atrial puncture is reported. Immediate thoracotomy and cardiac resuscitation were followed by mitral valvotomy; the patient has recovered completely. The crucial importance of relieving a stenotic lesion when cardiac arrest occurs is stressed. The post-operative care is described. Difficulties in the interpretation of withdrawal records obtained in this case are discussed.

The risks of left atrial puncture are reviewed, and complications observed in three other patients (cerebral and renal embolism in one and pulmonary consolidation in two) briefly described.

We thank Dr. R. Kauntze and Mr. D. N. Ross for permission to publish this case. We are particularly indebted to Mr. D. N. Ross for invaluable advice, and acknowledge the vital contribution made by the recovery ward staff.

†Case also referred to by Bailey (1955) and Musser and Goldberg (1957).

‡Case also referred to by Crafoord (1955) and Bagger *et al.* (1957).

REFERENCES

Atkinson, W. J. (1952). *Ann. roy. Coll. Surg. Engl.*, **11**, 367.
Bagger, M., Björk, V. O., and Malström, G. (1957). *Amer. Heart J.*, **53**, 91.
Bailey, C. P. (1955). *J. thorac. Surg.*, **30**, 394.
Björk, V. O. (1954). *Acta chir. scand.*, **107**, 466.
—— Malström, G., and Uggla, L. G. (1953). *Ann. Surg.*, **138**, 718.
Blakemore, W. S., Schnabel, T. G., Kuo, P. T., Conn, H. L., Langfeld, S. B., Heiman, D. D., and Woske, H. (1957). *J. thorac. Surg.*, **34**, 436.
Bosher, L. H. (1958). *Surgery*, **43**, 5.
Bougas, J. A. (1957). *J. thorac. Surg.*, **34**, 465.
—— Musser, B. G., and Goldberg, H. (1956). *Amer. Heart J.*, **52**, 359.
Brock, Sir R., Milstein, B. B., and Ross, D. N. (1956). *Thorax*, **11**, 163.
—— and Ross, D. N. (1955). *Guy's Hosp. Rep.*, **104**, 99.
Crafoord, C. (1955). *J. thorac. Surg.*, **30**, 393.
Crymes, T. P., Fish, R. G., Smith, D. E., and Takaro, T. (1959). *Amer. Heart J.*, **58**, 46.
Davila, J. C., Rivera, P. C., and Voci, G. (1958). *Amer. Heart J.*, **57**, 514.
Edstrom, R. F. S., and Essex, H. E. (1956). *Neurology (Minneap.)*, **6**, 118.
Fisher, D. L. (1955). *J. thorac. Surg.*, **30**, 379.
—— (1959). In *Intravascular Catheterization*, edited by H. A. Zimmerman.
Gadboys, H. L., Roy, S. B., and Dow, J. W. (1957). *Ann. Surg.*, **146**, 843.
Hancock, E. W. (1959a). *Brit. Heart J.*, **21**, 389.
—— (1959b). *Guy's Hosp. Rep.*, **108**, 349.
Javid, M., and Settlage, P. (1956). *J. Amer. med. Ass.*, **160**, 943.
Kavanagh-Gray, D., and Drake, E. H. (1958). *Amer. Heart J.*, **56**, 143.
Lawrence, G. H. (1956). *New Engl. J. Med.*, **225**, 180.
Lindberg, H. A., Wald, M. H., and Barker, M. H. (1939). *Arch. intern. Med.*, **63**, 907.
Lougheed, W. M., and Kahn, D. S. (1955). *J. Neurosurg.*, **12**, 226.
Lundberg, N., Nielsen, K. C., and Nilsson, E. (1956). Ibid., **13**, 235.
Maciver, I. N., Lassman, L. P., Thomson, C. W., and McLeod, I. (1958). *Lancet*, **2**, 544.
Milstein, B. B. (1956). *Ann. roy. Coll. Surg. Engl.*, **19**, 69.
Musser, B. G., and Goldberg, H. (1957). *J. thorac. Surg.*, **34**, 414.
Rosomoff, H. L., and Holaday, D. A. (1954). *Amer. J. Physiol.*, **179**, 85.
Rubin, M., and Shah, S. (1958). *Amer. Heart J.*, **55**, 55.
Samet, P., Litwak, R. S., Bernstein, W. H., Fierer, E. M., and Silverman, L. M. (1959). *Circulation*, **19**, 517.
Sedzimir, C. B., and Dundee, J. W. (1958). *J. Neurosurg.*, **15**, 199.
White, J. C., Verlot, M., Selverstone, B., and Beecher, H. K. (1942). *Arch. Surg. (Chicago)*, **44**, 1.

CONGENITAL MALFORMATIONS AFTER A TWO-HOUR INACTIVATION OF NICOTINAMIDE IN PREGNANT MICE

BY

LEONARD PINSKY, B.Sc.

AND

F. CLARKE FRASER, M.D., Ph.D.

Department of Genetics, McGill University, Montreal, Canada

This paper describes a method by which the action of a specific vitamin (nicotinamide) can be inhibited for a very brief period of embryonic development by an analogue (6-aminonicotinamide), and presents preliminary observations on the types and frequencies of malformations so produced in the mouse.

Major skeletal malformations have been observed in the offspring of pregnant rats (Murphy, Dagg, and Karnofsky, 1957) and mice (Pinsky and Fraser, 1959), and in newborn chicks from eggs (Landauer, 1957) treated with 6-aminonicotinamide. Simultaneous treatment with nicotinamide gave protection against the inhibitory effects of 6-aminonicotinamide as measured by the LD_{50} in mice (Johnson and McColl, 1955) and by teratogenicity in chicks and rats (Landauer, 1957; Murphy *et al.*, 1957). It has been demonstrated (Dietrich, Friedland, and Kaplan, 1958) that the inhibitory action of 6-aminonicotinamide on certain diphosphopyridine nucleotide (D.P.N.)-dependent reactions results from its rapid substitution for nicotinamide in the D.P.N. molecule to form an inactive D.P.N. analogue.

These results show that 6-aminonicotinamide causes malformations by interfering with some function of nicotinamide, probably with its role in D.P.N. synthesis. The rapidity with which 6-aminonicotinamide acts, and the ability of nicotinamide to protect against its effects, provided an opportunity to study the effects on embryonic development of precisely timed short exposures of pregnant mice to this nicotinamide antagonist.

Materials and Methods

A/Jax male mice, 3 to 4 months old, were placed overnight with C57BL/6 females which were observed for vaginal plugs in the morning. Similarly C57BL/6 males were mated with A/Jax females. Animals were maintained on Purina Lab Chow, supplemented with milk and lettuce once a week, and water *ad lib.*

At approximately 9½, 10½, or 11½ days after a vaginal plug was observed pregnant females were given a single intramuscular injection of 6-aminonicotinamide, the standard dose being either 0.4 or 0.5 mg., depending on whether the animal weighed less than or more than 23 g. on the morning a vaginal plug was observed. Females receiving 0.4 mg. of 6-aminonicotinamide were treated, two hours later, with 0.15 mg. of nicotinamide (the "single protective dose") or 0.3 mg. (the "double protective dose"). Females given 0.5 mg. of 6-aminonicotinamide received proportionately more nicotinamide (0.19 or 0.38 mg. respectively). Control females received the 6-aminonicotinamide and a single protective dose of nicotinamide simultaneously.

At 18½ days after insemination the animals were killed and the offspring removed. After gross examination most embryos were prepared for skeletal staining with alizarin, and some were fixed for histological study.

Results

The types of skeletal malformation produced by treating pregnant female mice of heterogeneous genetic background with 6-aminonicotinamide have been described previously (Pinsky and Fraser, 1959). Similar types of malformation were produced by the present method, except that the frequency of cleft-lip, with cleft-palate, reported as showing an equivocal increase over the control figure in the previous experiment, showed a marked increase in C57BL × A/Jax embryos treated on day 9½ in the present experiment.

Protective Action of Nicotinamide

In evaluating our results four criteria of teratogenic activity were used: (1) frequency of *resorption sites*, as identified by the presence of a recognizable placenta with no embryo, or a resorbing embryo; (2) frequency of *cleft-palate*, without cleft-lip; (3) frequency of *cleft-lip*, with cleft-palate; (4) frequency of major *hind-limb defects*, defined as absence or extreme hypoplasia of the tibia and/or severe digital anomalies.

To find out whether a "single protective dose" of nicotinamide is, in fact, fully protective two tests were used. Firstly, the "single protective dose" was given simultaneously with the 6-aminonicotinamide. This

treatment caused no appreciable increase in number of resorption sites, and no malformations (Tables I, II, and III), suggesting that, given simultaneously, a "single protective dose" of nicotinamide protected the embryos against the teratogen. However, when the same dose was given two hours after the teratogen there was a marked rise in frequency of both resorptions and malformations. This means either that a two-hour deficiency of 6-aminonicotinamide is teratogenic, or that the single protective dose of nicotinamide did not completely inhibit the effect of the 6-aminonicotinamide, so that the teratogen acted for a period longer than two hours. If the latter possibility was in fact the case, one would expect that a "double protective dose" of nicotinamide given two hours after the teratogen would result in a lower frequency of malformations than the "single protective dose."

Table I shows that for treatment on gestation day 9½ the frequency of cleft-lip and cleft-palate and of hind-limb defects was much lower after a double dose of nicotinamide than after a single dose given two hours after the 6-aminonicotinamide. The frequency of observable resorption sites is approximately the same for the single and double doses of nicotinamide. However, the small size of the litter in the single-dose series suggests that after this treatment some embryos resorbed so early that they were not observable on day 18, and that the true resorption rate may be much higher than the observed one. It can be concluded, therefore, that malformations, and probably resorptions, occurred less often after a "double protective dose" of nicotinamide than after a single dose. Thus on day 9½ the "single protective dose" of nicotinamide does not seem to correct fully the inhibitory action of 6-aminonicotinamide when given two hours after the analogue, though it does when the analogue and vitamin are given simultaneously.

TABLE I.—*Embryonic Effects of Injecting C57BL/6 Females Mated to A/Jax Males with 6-Aminonicotinamide, and Two Hours Later with Nicotinamide, on Day 9½ of Gestation*

Nicotinamide	Interval Between Teratogen and Nicotinamide (Hours)							
	0		2					
	Single Dose		Single Dose		P		Double Dose	
Foetuses	No.	%	No.	%			No.	%
Females treated	5	—	6*	—			12	—
Implantation sites	40	—	28	—			79	—
Resorption ,,	0	0	3	10·7	<0·5		13	16·5
Viable foetuses	40	100	25	89·3			66	83·5
Mean size of litter	8		4·7		<0·3		6·6	
Foetuses with cleft-lip and -palate	0	0	9	32·1	<0·001		2	2·5
Foetuses with hind-limb defects	0	0	14	50·0	<0·01		15	18·9

* Two treated females, not pregnant on day 18, were not examined for resorption sites, and were not included in the table.

Table II presents the results of treating C57BL/6 × A/Jax embryos on day 10½ of gestation. No malformations were noted in embryos treated at this stage of development, but there was a high frequency of resorptions when nicotinamide was given two hours after the 6-aminonicotinamide, both for the single-dose and the double-dose series. The frequency after the double dose was somewhat, but not significantly, lower than that for the single dose, suggesting that the single dose gave a high degree of protection against the resorption-causing activity of 6-aminonicotinamide on this gestational day.

TABLE II.—*Embryonic Effects of Injecting C57BL/6 Females Mated to A/Jax Males with 6-Aminonicotinamide, and Two Hours Later with Nicotinamide, on Day 10½ of Gestation*

Nicotinamide	Interval Between Teratogen and Nicotinamide (Hours)							
	0		2					
	Single Dose		Single Dose		P		Double Dose	
Foetuses	No.	%	No.	%			No.	%
Females treated	5		7*				11	
Implantation sites	37		50				90	
Resorption ,,	1	2·7	34	68·0	<0·2		51†	56·4
Viable foetuses	36	97·3	16	32·0			39	43·6
Mean size of litter	7·4		7·1				8·2	
Foetuses with malformations	0	0	0	0			0	0

* One treated female, not pregnant on day 18, was not examined for resorption sites, and was not included in the table.
† P<0·001 for simultaneous *v.* double dose.

TABLE III.—*Embryonic Effects of Injecting A/Jax Females Mated to C57BL/6 Males with 6-Aminonicotinamide, and Two Hours Later with Nicotinamide, on Day 11½ of Gestation*

Nicotinamide	Interval Between Teratogen and Nicotinamide (hours)							
	0		2					
	Single Dose		Single Dose		P		Double Dose	
Foetuses	No.	%	No.	%			No.	%
Females treated	7		5				7	
Implantation sites	46		36				42	
Resorption ,,	0	0	7	19·4			8	19·1
Viable foetuses	46	100	29	80·6			34	80·9
Mean size of litter	6·6		7·2				6·0	
Foetuses with cleft-palate	0	0	16	44·4	<0·30		14†	33·3

† P <0·01 for simultaneous *v.* double dose.

A similar conclusion can be drawn for A/Jax × C57BL embryos treated on day 11½ (Table III). The resorption frequency was the same after a double dose as after a single dose of nicotinamide given two hours after 6-aminonicotinamide. The frequency of cleft-palate after the double dose of nicotinamide was not significantly lower than after the single dose. Thus it would seem that for this cross, and on this gestational day, a single dose of nicotinamide is almost or just as effective as a double dose in counteracting the teratogenic effects of 6-aminonicotinamide.

Furthermore, the relatively high frequency of malformations even after a "double protective dose" of nicotinamide suggests that a two-hour exposure to the inhibitory effects of 6-aminonicotinamide is enough to cause irreversible development errors. The teratogenic effects of even shorter periods of exposure to the teratogen are being investigated.

Conclusions

Though our study is far from complete, the results so far obtained are interesting from several points of view.

1. Cleft-lip and cleft-palate, and hind-limb defects, occurred after treatment on day 9½, no malformations were observed after treatment on day 10½, and cleft-palate (without cleft-lip) occurred after treatment on day 11½. This suggests that the short-term teratogenic exposure achieved by injecting nicotinamide two hours after injecting 6-aminonicotinamide may greatly improve the precision with which one may define the "critical" period in development at which a teratogen acts to produce a given malformation.

2. Study of the protective effect of a vitamin against the teratogenic activity of its antagonist appears to be a

useful method for analysing the vitamin requirements of various organogenetic processes in the developing embryo, and it is interesting that the nicotinamide requirements of the embryo–mother system studied appeared to vary from one gestational day to another. This approach might profitably be extended to other compounds as well.

3. Though the standard dose of 6-aminonicotinamide without protection produces marked weakness within 6 to 12 hours (Pinsky and Fraser, 1959), the two-hour treatment with 6-aminonicotinamide, followed by a protective dose of nicotinamide, does not produce any signs of distress in the mother. Nevertheless, this brief exposure is highly teratogenic in mice.

4. Though it is unwise to extrapolate experimental findings in mice to human beings, our results emphasize the need for careful nutritional and metabolic studies of mother and embryo in normal pregnancies and in those that give rise to malformations.

The financial assistance of the National Research Council of Canada is gratefully acknowledged. The 6-aminonicotinamide was kindly supplied by Dr. J. D. McColl, of Horner Laboratories Montreal.

REFERENCES

Dietrich, L. S., Friedland, I. M., and Kaplan, L. A. (1958). *J. biol. Chem.*, **233**, 964.
Johnson, W. J., and McColl, J. D. (1955). *Science*, **122**, 834.
Landauer, W. (1957). *J. exp. Zool.*, **136**, 509.
Murphy, M. L., Dagg. C. P., and Karnofsky, D. A. (1957). *Pediatrics*, **19**, 701.
Pinsky, L., and Fraser, F. C. (1959). *Biol. neonat. (Basel)*, **1**, 106.

Medical Memoranda

Rupture of the Triceps Tendon

Sudden rupture of the triceps tendon is rare. Conwell and Alldredge (1937) describe triceps rupture as the least common of all tendon ruptures, as also do Waugh *et al.* (1949) writing of personal experience. Gilcreest (1925), however, lists frequency of rupture in the following order: Achilles tendon, quadriceps tendon, biceps and triceps of arm, rectus abdominis, supraspinatus and adductors of thigh, trapezius, pectoralis major and minor.

CASE HISTORY

A 24-year-old building-erector was admitted to hospital, having fallen 18 ft. (5.5 m.), landing on his outstretched right arm. Apart from numerous abrasions about the face and right thigh, there were clinical signs of a fracture of the right wrist. Swelling around the right elbow was noted, together with abrasions over the olecranon and upper part of the ulna, but there was no bony tenderness. *X*-ray examination revealed a fracture through the lower end of the radius and the styloid process of the ulna with some dorsal angulation. Just visible on the radiograph was the elbow showing avulsion of an olecranon spur. Re-examination of the elbow revealed loss of active extension and a palpable gap immediately proximal to the olecranon.

At operation next day the triceps tendon was found completely avulsed from its attachment to the olecranon. Repair was effected by three soft-tissue catgut mattress sutures placed respectively medially, laterally, and posteriorly. The wrist fracture was manipulated and the arm immobilized in an above-elbow plaster cast with the elbow 60 degrees short of full extension. The cast was discarded after 34 days and active use of all joints encouraged. An *x*-ray film two weeks later showed that the avulsed olecranon spur lay in contact with the olecranon, indicating that the soft-tissue repair had been effective. Four months after the injury the patient was discharged from hospital with a clinically normal wrist and a normal range of movement and power at the elbow.

COMMENT

The only previously reported example of sudden rupture of the tendon of the triceps is that described by Anderson and LeCocq (1957). A 28-year-old man fell from a log and suffered a complete rupture of the triceps tendon at the point of its insertion into the olecranon. The tendon was reattached by a braided stainless-steel wire passed through two holes drilled in the olecranon. The elbow was immobilized for three weeks. Full strength was regained, but elbow extension lacked about five degrees. The same authors also describe a rupture of the triceps tendon in a 27-year-old woman that was not seen until one year after the original accident.

Montgomery (1920) and Gilcreest (1925) each describe an example of rupture at the musculotendinous junction of the triceps. Gilcreest suggests that excessive fatigue may be a relevant factor, as it renders muscle fibres much less likely to resist a sudden or forceful pull or jerk, and states that ruptures of the biceps and triceps are not uncommon in baseball players and weight-lifters.

The example of rupture of the triceps tendon described here is of interest in that it was associated with a fracture of the lower end of the radius in the same arm, the wrist injury being the only lesion about which the patient was complaining when examined soon after the injury, and is a reminder of the importance of a thorough clinical examination after an injury. It demonstrates that a simple effective repair is possible with absorbable material and without transfixing bone.

I am grateful to Mr. J. C. Scott, Director of the Accident Service, for permission to publish this case report.

M. L. H. LEE, B.M., F.R.C.S.,
Senior Registrar,
Accident Service, Radcliffe Infirmary, Oxford.

REFERENCES

Anderson, K. J., and LeCocq, J. F. (1957). *J. Bone Jt Surg.*, **39A**, 444.
Conwell, H. E., and Alldredge, R. H. (1937). *Amer. J. Surg.*, **35**, 22.
Gilcreest, E. L. (1925). *J. Amer. med. Ass.*, **84**, 1819.
Montgomery, A. H. (1920). *Surg. Clin. Chicago*, **4**, 871.
Waugh, R. L., Hathcock, T. A., and Elliott, J. L. (1949). *Surgery*, **25**, 370.

The scientific and medical library of the late Dr. Archibald Gilpin which was sold at Sotheby's recently realized nearly £17,000. The highest price was £1,800 paid for the first edition of Vesalius's *Anatomy* (1543)—a figure which easily outstrips the previous highest price for this treatise, £650 paid for the Stirling-Maxwell copy two years ago. Thomas Addison's *Diseases of the Supra-renal Capsules* (1855) fetched £450, and Auenbrugger on percussion as a means of diagnosis (Vienna, 1761) £850; £300 was given for Columbus's *Anatomy* (Venice, 1559); £580 for Jenner's book on vaccination (1798)—for which £125 was given in 1953; £260 for Servetus's *Restitutio*, containing the first description of the lesser circulation, most copies of which had been burnt with Servetus at the stake; £230 for Roentgen's announcement of his discovery of *x*-rays; and £450 for Glisson's treatise on rickets (1650). Bright's *Reports* (1827–31), including the famous description of Bright's disease, fell to an anonymous English private collector for £500, as did also, for £350, Parkinson's treatise on the Shaking Palsy (Parkinson's Disease). (*The Times*, May 31.)

Reviews

"THE GREATEST, WISEST, MEANEST OF MANKIND"

Francis Bacon, The First Statesman of Science. By J. G. Crowther. (Pp. 362+xv; illustrated. 35s.) London: Cresset Press. 1960.

"The history of human knowledge points out . . . no man [but Bacon] whose prophetic genius would have enabled him to delineate a system of science which had not yet begun to exist." (John Playfair.)

Playfair's estimate is approximately that of Mr. Crowther in this work that celebrates the quater-centenary of Lord Bacon's birth. Queen Elizabeth I, who was no mean judge of men and not a little interested in the advancement of her country and people, judged him less highly. Until her death Bacon sought advancement from her in vain. Nowadays no one will deny to him a full measure of philosophic vision. Perhaps no one has summed him up better for his intellectual gifts than has his contemporary, the father of Christopher Wren:

> "This Noble Lord, as greate a Secretarye in the highe Court of Nature as ever any of this Western World, tells us by way of Rebuke that the Nature of the Glow-worme was never yet Well observed, Which is most true; But then Hee should have offered somewhat of his owne to this great Deficiency."

That would have been a hard task, but the avoidance of this hard task was indeed the weak point of Lord Verulam, for he made no significant addition to any branch of knowledge, despite his eloquence and industry. But—moral questions apart—it was not his only weak point, for no great man of science has followed or ever will follow the Baconian method or rule of discovery. This last deficiency is hardly referred to in Mr. Crowther's otherwise excellent and interesting book. More remarkable still is the odd fact that the great founders of the Royal Society, which came to birth a hundred years after Bacon, were unanimous in believing that they were working in Bacon's spirit. Yet each of them was, as we now know, searching out Nature's ways after his own fashion and disregarding any imposed method. There is, in truth, no such thing as a method of discovery. It may come to one man after immense systematic analysis, to another by analogy, to a third as a sudden thought or vision, to yet another even as a dream, and in a hundred other ways. There is a method (or methods) of scientific *demonstration*, but that is a different thing from *discovery*. It is demonstration that is the basis of science.

Since this year is the third centenary of the Royal Society, Mr. Crowther's book is thus doubly welcome. It rightly estimates Bacon's distant—not his near—vision. The wheel has now turned full circle and science has become so divided that it is necessary to decide on the distribution of our scientific forces. Bacon saw that this would happen. He would have made a far better first Minister of Science, to whom we may commend the study of his works, than he was a Lord Chancellor. But he was the first philosopher of science and the man who had, perhaps, the longest vision of all such philosophers. These are claims enough for any man and fully justify Mr. Crowther's softening of the verdict that the greatest and wisest of mankind was also the meanest. He was also certainly one of our greatest phrase-makers. A welcome book.

CHARLES SINGER.*

*This review was received shortly before Professor Singer's death on June 10.

ROYAL SOCIETY BIOGRAPHIES

Biographical Memoirs of Fellows of the Royal Society. 1959. Volume 5. (Pp. 279; illustrated. 30s.) London: The Royal Society. 1960.

The fifth volume in this excellent series contains 19 memoirs, each with a portrait and full bibliography. The roll-call of the dead numbers seven physicists (including Ludwig Prandtl, "the father of aerodynamics"), three engineers, three chemists, an astronomer, an Antarctic explorer and geologist (Sir Douglas Mawson), a pathologist, a zoologist, and a psychologist. The nineteenth on the roll is W. R. G. Atkins, one who achieved distinction in botany, chemistry, and physics, which few can hope to do in these days of specialization. He applied physical and chemical methods to the solution of biological problems. In 1942 he was given the rank of captain in the R.A.M.C., and did physiological testing at medical centres which resulted in several papers on the vitamin-C reserves of troops and kindred matters.

Another scientist whose work had a close relation to medicine was K. S. Lashley, professor of psychology at Harvard and then, in 1937, research professor of neuropsychology. One of the deceased Fellows, Sir James Swinburne (1858–1958), the engineer, was a centenarian, the third F.R.S. to attain this age. The other two were Sir Moses Montefiore (1784–1885) and H. N. Ridley, botanist, who died in 1856.

While each memoir repays perusal, medical readers will be specially interested in that of Sir Robert Muir (1864–1959) by Professor Sir Roy Cameron. "Bobby" Muir, as his students called him, held the chair of pathology at Glasgow for thirty-six years. He was not only an able morbid anatomist and histologist but also a great bacteriologist, his *Manual of Bacteriology* (written with Professor J. Ritchie) having been the text-book of many medical students since its first appearance in 1897. Muir's *Text-Book of Pathology*, issued in 1924, is a classical exposition of the subject. He made a number of researches in pathology, including work on the relationship that exists between duct papilloma and cancer, but his chief researches were concerned with immunology and culminated in the publication of his *Studies on Immunity* (1909). He was also a born teacher, an able director of research, a tireless worker, and a kindly man. Sir Roy Cameron includes a number of anecdotes in the memoir illustrating these several aspects. But he does not include one of more recent date. Muir had sometimes the habit of expressing his thoughts aloud, and in his ninetieth year, being present at a medical dinner, one of the speakers was unduly prolix. "Bobby" fidgeted for some time, and then, rising, remarked: "Havers, man, we've heard all this before. I'm going home!" The speech abruptly ended; *solventur risu tabulae.*

ARTHUR S. MACNALTY.

BOOKS ON BUTTERFLIES

A Bibliography of British Lepidoptera 1608–1799. By Arthur A. Lisney, M.A., M.D., F.R.E.S. (Pp. 315+xviii; illustrated. £9 9s.) London: Privately printed for the author by the Chiswick Press. 1960.

Dr. Arthur Lisney is Medical Officer of Health and the Principal School Medical Officer for the County of Dorset, but he is also well known as an entomologist and as a collector and keen student of the literature of the British lepidoptera. His book is the first attempt which has been made to give us a historical bibliography of the subject and will eventually be completed by a further volume covering the nineteenth century. His account gives us in chronological order a brief biography and detailed bibliographical description of the works of all those who have written of British lepidoptera, and the handsomely produced volume contains numerous portraits and facsimiles. His bibliographical method is based on that of Sir Geoffrey Keynes and is quite adequate for its purpose.

One is impressed by the wide range of authors and the great rarity of some of the books described. Among the authors may be found such familiar names as Thomas Moffett, Christopher Merrett, Martin Lister, James Pettiver, John Lettsom, and George Shaw, all of whom were medical men, except Pettiver, who was an apothecary. All were also Fellows of the Royal Society, and one of them, Merrett, a Founder Fellow, an association which is now continued by the fact that a grant awarded by the Royal Society facilitated this timely publication. It is a book which will be immediately recognized as a valuable aid to the historian of the natural sciences and as an indispensable reference work for any library.

F. N. L. POYNTER.

AURAL SURGERY

Surgery of the Ear. By George E. Shambaugh, jun., M.D. (Pp. 669+viii; illustrated. £7 12s. 6d.) Philadelphia, London: W. B. Saunders Company. 1959.

During the thirty-odd years which have elapsed since the publication in English of a textbook devoted to diseases of the ear, some very remarkable changes have taken place in this subject. Then the emphasis was on saving life threatened by suppurative ear disease and its complications. The surgical treatment of deafness, of vertigo, and of facial palsy was still in the daring hands of pioneers, and was considered hardly respectable. The advent of chemotherapy and the antibiotics greatly reduced the necessity for surgery in suppurative ear disease, and certainly reduced its dangers; while at the same time they helped to turn the operations for non-suppurative conditions from surgical adventures to established and valued procedures. These new and intricate operations have long needed a definite description worthy of their achievements, and here it all is.

Shambaugh's *Surgery of the Ear* is the greatest event in otological literature since Sir Charles Ballance's *Surgery of the Temporal Bone*, and it should be in the hands of every student of aural surgery. The illustrations, of which there are 326, are excellent, and what adds to their value is that they depict what the surgeon sees with the patient lying on the operating table instead of the conventional view as if the patient were sitting upright.

But this is not merely a surgical atlas in which the text is sacrificed for the pictures. The text is full, authoritative, easy to read, and each subject has a historical introduction which adds to the general interest and makes this book a must for medical school and society libraries. Dr. Shambaugh's book is a model of what a surgical manual should be. It is clearly written by a master of his subject, and, though it is very up to date, great care has been taken to describe accurately the events which led up to the advances in surgical otology.

TERENCE CAWTHORNE.

PUZZLING DIAGNOSES

Practical Leads to Puzzling Diagnoses. Neuroses That Run Through Families. By Walter C. Alvarez, M.D., D.Sc. (Pp. 490+x. 72s.) Philadelphia, Montreal: J. B. Lippincott Company. London: Pitman Medical Publishing Co., Ltd. 1959.

In this book the author presents two main themes. First he emphasizes the importance of a detailed family history, especially when a patient in a medical clinic complains of vague or bizarre symptoms for which no organic basis can be found. When some of the patient's relatives show evidence of psychosis or neurosis (which must indeed be frequent), he regards this as evidence that the patient's symptoms are non-organic in origin. He believes that the members of such a family have genetic defects which can manifest themselves in different ways, and to support his views he describes family histories, a "not unusual" one being that of a patient with hysteria who has a psychotic mother, an alcoholic uncle, a mentally retarded brother, a constitutionally inadequate sister, and an epileptic child. He would seem to be trying to revive the concept of "blastophthoria" of Forel or the "neuropathic diathesis" of Tredgold (*circa* 1901), who similarly argue that the difference between, say, hysteria and schizophrenia is one of degree. This idea is now out of favour amongst geneticists, who would regard it as naive and retrogressive. However, facts are what matter, and the author presents what he calls a statistical study of 673 patients and their relatives. This is unconvincing.

The second theme is the development of the author's discovery, in 50 years' experience, that a large proportion of patients presenting themselves at medical clinics with various physical complaints have no organic disease and the aetiology is, in fact, emotional. Any psychiatrist, of course, could have told him this. He follows this to the conclusion that if so many patients seen in medical clinics are in fact non-organic, then "it is up to non-psychiatrists to study them adequately." "If all of us would spend more time in explaining to a man with a psychosomatic trouble what is wrong, we could change many a disgruntled patient into a satisfied and grateful one." This is salutary advice, but few of his phobic patients are likely to be satisfied and grateful. He tells them that "the only way a man can get over a phobia is to keep fighting until he licks it. This takes great will power but it can be done."

Perhaps the main defect of the book is that about 90% of it consists of inadequate case-histories. This makes for dull reading, and the author seems to suppose that if he describes, say, 24 heterogeneous cases in a chapter headed "Nervous Fever" he has demonstrated

something. It is obvious that selected cases from an experience as vast as the author's prove nothing.

A. W. BEARD.

ALLERGY

Allergie und Allergische Erkrankungen. Volumes I and II. Edited by E. Rajka. (Pp. Vol. I: 638; Vol. II: 1,003; illustrated.) Budapest: Akadémiai Kiadó. 1959.

This is a voluminous textbook of allergy written by Hungarian authors and translated into German. The first volume deals with the general aspects of allergy—sensitization and desensitization, immunochemistry of antigens and antibodies, serology, histology, and with the general principles of diagnosis and treatment. The second volume deals with the allergic disorders of the various organ systems. No aspect of allergy has been left out. The material the numerous authors have compiled is admirable and the competent international literature is extensively quoted. However, the review of our present knowledge is often not critical, but more in the nature of a neutral abstract so that the reader is left to form his own opinion without the guidance of the author.

Professor Rajka, the editor, has written the lion's share of the first volume and most of the dermatological part of the second. The length of the various contributions in this volume is often out of proportion to their importance: dermatology fills 300 pages, respiratory allergy about 100, and all other allergy 600 pages. Many disorders are listed as allergic without satisfactory evidence: for instance, an attack of angina pectoris after a severe asthmatic attack is described as "allergic angina pectoris." There is also an allergic meningitis, an allergic headache (apart from migraine), allergic neuralgia of the trigeminal nerve, allergic fatigue in childhood [*sic*] and the like. The tendency to draw as many disorders as possible into the allergy fold is obvious, but this is a common failing in other textbooks of allergy. Errors are frequent in the second volume, particularly in the chapter on urogenital allergy, where the intolerance to ephedrine in elderly men with prostatic hypertrophy is explained as an allergic reaction.

In spite of these disadvantages, the work contains so much valuable and up-to-date material that it is a welcome supplement to the available American texts, both of which are much older.

H. HERXHEIMER.

The *Cumulative Supplement, 1959,* to the *British Encyclopaedia of Medical Practice* gives details of the points where current practice or knowledge now differs from that given in the main volumes of the *Encyclopaedia.* These points cover knowledge of proved value, and nothing controversial or doubtful is included. Occasionally completely new headings are incorporated: in the 1959 *Supplement,* now available, this has been done in the instance of A.C.T.H., cortisone, and related subjects; haemolytic diseases; and fluid and electrolyte balance. A separate volume, *Medical Progress, 1959,* is published together with this *Supplement,* and differs in that it gives a survey of all forms of medical research whether or not they have been established. According to the preface to the *Progress,* the past year witnessed no spectacular advances in medicine, but steady progress and fruitful research in every branch. (Butterworth and Co. (Publishers) Ltd., *Cumulative Supplement, 1959*: 445 pp.; 35s.; *Medical Progress, 1959*: 327+xx pp., index, 37s. 6d. Combined price 67s. 6d.)

BOOKS RECEIVED

Review is not precluded by notice here of books recently received.

Radiologic Records. By Sister Christina Spirko, C.S.J., R.T., B.S., in R.T., M.A., F.A.S.X.T. (Pp. 304+xxviii; illustrated. 68s.) Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1960.

Modern Nutrition in Health and Disease. Dietotherapy. Edited by Michael G. Wohl, M.D., and Robert S. Goodhart, M.D. Second edition. (Pp. 1,152; illustrated. £6 18s.) London: Henry Kimpton. 1960.

Pharmacology and Therapeutics. A Textbook for Students and Practitioners of Medicine and its Allied Professions. By Arthur Grollman, Ph.D., M.D., F.A.C.P. Fourth edition, revised and enlarged. (Pp. 1,079; illustrated. 93s. 6d.) London: Henry Kimpton. 1960.

Research Conference on Therapeutic Community held at Manhattan State Hospital, Ward's Island, New York. Compiled and edited by Herman C. B. Denber, M.D. (Pp. 265+xvi; illustrated. 88s.) Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1960.

Some Papers on the Cerebral Cortex. Translated from French and German by Gerhardt von Bonin. (Pp. 396+xxiv; illustrated. 92s.) Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1960.

Interpersonal Relationships in the Hospital. By Warner F. Bowers, A.B., B.Sc., M.D., M.Sc., Ph.D.(Surg.). (Pp. 125+vii. 40s.) Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1960.

Basic Office Dermatology. By Stuart Maddin, M.D., Julius L. Danto, M.D., and William D. Stewart, M.D., F.R.C.P.(C). (Pp. 308+xix: illustrated. 94s.) Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1960.

Intussusception in Infants and Children. By Mark M. Ravitch, M.D. (Pp. 121+xi; illustrated. 76s.) Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1960.

A Stereotaxic Atlas of the Dog's Brain. By Robert K. S. Lim, M.B., Ch.B., Ph.D., D.Sc., Chan-Nao Liu, Ph.D., and Robert L. Moffitt, B.S. (Pp. 93+vii. 74s.) Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1960.

A Primer of Medicine. Being an Introduction to Clinical Neurology, Alimentary, Respiratory, and Cardiovascular Diseases. By M. H. Pappworth, M.D., M.R.C.P. (Pp. 241. 32s. 6d.) London: Butterworth and Co. (Publishers) Ltd. 1960.

The Wish to Fall Ill. A Study of Psychoanalysis and Medicine. By Karin Stephen. (Pp. 238. 10s. 6d.) Cambridge University Press. 1960.

'Nerves' and Their Cure. By C. Edward Barker. (Pp. 198. 16s.) London: George Allen and Unwin, Ltd. 1960.

Handicapped Youth. A Report on the Employment Problems of Handicapped Young People in Glasgow. By Thomas Ferguson and Agnes W. Kerr. (Pp. 141+vi. 15s.) London, New York, Toronto: Oxford University Press for the Nuffield Foundation. 1960.

Psychiatry: Descriptive and Dynamic. By Jackson A. Smith, M.D., F.A.C.P. (Pp. 342. 56s.) Baltimore: Williams and Wilkins Company. London: Baillière, Tindall and Cox, Ltd. 1960.

Handbook of Neurological Diagnostic Methods. Edited by Fletcher McDowell, M.D., and Harold G. Wolff, M.D. (Pp. 201+ix; illustrated. 36s.) Baltimore: Williams and Wilkins Company. London: Baillière, Tindall and Cox, Ltd. 1960.

Principles of General Physiology. Volume II. ***General Physiology.*** By L. E. Bayliss. (Pp. 848+xxiii; illustrated. 85s.) London: Longmans. 1960.

An Introduction to Embryology. By B. I. Balinsky, Dr.Biol.Sc. (Pp. 562+xiv; illustrated. 54s.) Philadelphia and London: W. B. Saunders Company. 1960.

The Development of the Infant and Young Child: Normal and Abnormal. By R. S. Illingworth, M.D.Leeds, F.R.C.P., D.P.H., D.C.H. (Pp. 318+viii: illustrated. 27s. 6d.) Edinburgh and London: E. and S. Livingstone, Ltd. 1960.

BRITISH MEDICAL JOURNAL
LONDON
SATURDAY JULY 16 1960

"THE INVISIBLE COLLEGE"

The Royal Society began 300 years ago with a small group of gentlemen and "amateurs" whose one aim was to break the chains of authority and tradition in natural philosophy and to investigate the secrets of nature by means of observation and experiment. The greatest triumph of the new method, at the time when the Society was founded, was the work of William Harvey in biology and medicine. Since the functioning and disorders of the human body compelled attention then as now, it is not surprising that medical men played an important part in the Society's foundation, and, as may be seen from the impressive account written by Sir Arthur MacNalty (p. 171), supplied subsequently so many of its distinguished Presidents. Canon Charles Raven, in his essay at p. 169, brings out the special contribution of medicine to science and the remarkable breadth of experience and knowledge of eminent doctors in the sixteenth and seventeenth centuries.

The several histories of the Royal Society, to which must now be added the admirable *Brief History* written by E. N. da C. Andrade[1] for the Tercentenary, as well as the much more comprehensive and detailed volume edited by Sir Harold Hartley,[2] are all written from the standpoint of the scientist, and it is therefore valuable to have the view of the social historian, especially when it is presented with the shrewd insight revealed in the refreshing and stimulating article by Mr. Peter Laslett published in the opening pages of the *Journal* this week. The history of the Society may be seen as composed of three movements: a brilliant opening sparkling with genius; a dull and undistinguished period in the eighteenth century, when the Society became fair game for lampoons by sharp-tongued satirists; and then, with the emergence of the professional scientist, including the medical scientist, as we know him to-day, a gradual return to its early inspiration and the unique character by which it is recognized the world over.

In an important new study of the origins of the Society, Professor Douglas McKie[3] shows that the movement of which the Society was to become the chief organ had its beginnings in the Renaissance. "Gilbert," he says, "was the first modern scientist, that is, the first experimental scientist; he preceded Galileo; and his *De magnete* is the first classic of modern physics." Not only in the foundation of the Society then, but in the establishment of modern scientific method, medical men were found among the leaders and pioneers, for William Gilbert was an M.D. of Cambridge, a Fellow of the College of Physicians, and physician to Queen Elizabeth, and his great book was published exactly 60 years before the event of which we are now celebrating the Tercentenary. No wonder is it that in his book *The Origins of Modern Science* Professor Butterfield called Medicine "the Queen of the Sciences." But, if many of the special sciences are indebted to medicine and to the early studies of medical men for their origins, the debt has been amply repaid. Medical research is no longer the exclusive preserve of medical men, and a large proportion of those engaged in it are trained only in one or other of the special sciences which are represented by the galaxy of talent in the Royal Society. This is as it should be, for the founders were strongly imbued with the desire to help their fellow men and to pursue the discovery of useful knowledge. The motto for medical research to-day might well be an adaptation of Terence's phrase *Nihil humani a me alienum puto*, for it is often called upon to busy itself not only with human biology but with all branches of science, from geology to nuclear physics and metallurgy. The Royal Society provides common ground for the most competent specialists in all these branches and is the one place where specialist can talk to specialist with the greatest chance of being understood. The Fellow most likely to understand him will probably be one who is medically qualified. And just how diverse and far-reaching is the experience of doctors to-day may be seen from the list published at p. 207 of medical men now living who may proudly put F.R.S. after their names.

The President, Sir Cyril Hinshelwood, has said, "The most important activity of the Royal Society is not an organized one at all; it is simply the sum total of all that the individual Fellows do in their own right. Should the Society take any credit for this? Well, why not? The Fellows are the Society and the Society is the Fellows."[4] Following this line of thought, it may be claimed that the Tercentenary is a great medical event, for the roll of Fellows contains all the pioneers of modern medicine, from Glisson and Willis to Banting and Fleming, and includes among its foreign Fellows Malpighi, Haller, Virchow,

[1] Andrade, E. N. da C., *A Brief History of The Royal Society*, July, 1960. The Royal Society, London. 10s. 6d.
[2] Hartley, H., ed., *The Royal Society, Its Origins and Founders*, July, 1960. 35s.
[3] —— Ibid., p. 1.
[4] —— Ibid., p. 260.

Koch, Pavlov, Ehrlich, and Freud. Besides bringing together those who have already won renown by their work the Society has also sponsored useful co-operative studies of its own, as may be seen in the eight reports of the Malaria Committee published between 1900 and 1903, the four reports of the Sleeping Sickness Commissions between 1902 and 1911, and similar work on Malta fever, cataract, kala-azar, filariasis and nephritis, and cholera. A bequest in 1924 enabled the Society to establish its own medical research fund. During the coming week there will be much pride in a great tradition, but the Society's motto, *Nullius in Verba*, is there to remind its Fellows that while tradition may adorn and enrich our lives it may not command. Nor must it ever hinder "those new adventures of the mind in which the Fellowship is so intimately concerned." The Royal Society of London for Improving Natural Knowledge, to give it its full and official title, has a tradition which is unequalled. It is the oldest surviving scientific society in the world, and its official journal, the *Philosophical Transactions*, has by far the longest history among current scientific periodicals. And in the *Transactions* the continuity of the history of science is made manifest.

LIVE POLIOVIRUS VACCINES

The quest for the prevention of poliomyelitis and the control of poliovirus infection has entered a new phase with the use of live vaccines. The report[1] in this journal of the Moscow conference on this subject described the astonishing progress made in the U.S.S.R., where more than 50 million persons have received vaccines prepared from Dr. A. B. Sabin's strains. The safety of the vaccines was upheld, the degree of protection as judged by antibody formation in the population was satisfactory, and poliomyelitis has receded from the areas where the vaccines were used. Short-term assessment of the efficacy of the vaccine seemed to suggest that these vaccines promise eventual "eradication" of the disease.

These remarkable results and others reported from other countries were considered by members attending the Second International Conference on Live Poliovirus Vaccines convened by W.H.O. and the Pan American Health Organization and held in Washington last month. New data concerning laboratory studies of the viruses used as seed for the vaccines, on the serological effect of the vaccines in their human hosts, and on the properties of the viruses excreted by the latter also received detailed consideration. The summary report issued at the close of the conference shows that the need for sober judgment and for scientific common sense is just as great now as when the method of immunization by live poliovirus vaccine was introduced in 1950 by Dr. Hilary Koprowski, whose account of the historical aspects of the development of live virus vaccine in poliomyelitis was published in this journal last week.

Further study of the virus strains used to make the vaccines has confirmed previous findings on their attenuated virulence for the nervous system of the monkey and also the differing order of neurovirulence possessed by the master strains respectively sponsored by A. B. Sabin, H. R. Cox, and H. Koprowski. The proposed "markers," or cultural and other *in vitro* characters of the viruses, exhibit, however, a disappointing degree of correlation with neurovirulence, so that monkey tests still appear to be essential for study of the vaccine strains and of the progeny excreted from the alimentary tracts of the infected human hosts and their contacts. As Dr. Herald Cox and his team point out in their article at p. 188 of the *Journal* this week, a big difficulty confronting investigators is how to predict the behaviour of a virus in a human population from what is known about its behaviour in the laboratory. A bothersome finding has been the discovery of a virus, presumably simian in origin, which is present in many vaccines, including seed strains, and demonstrable only in kidney cultures of monkeys of the species *Cercopithecus aethiops* (vervet or grivet monkeys). The extraordinary difficulty of excluding extraneous agents from live vaccines is thus again demonstrated.

New field trials with all three groups of vaccines were reported at the Washington conference by 24 groups of workers from 13 countries. Again, small-scale trials on fewer than 500 persons proved to be the best from the standpoint of strict surveillance. Nevertheless in nearly all the trials no harmful effects were encountered in either those receiving vaccine or their contacts, and the safety of the vaccines continued to be upheld. However, when such vaccines are used, as they have been, in the face of epidemics or of minor prevalences of poliomyelitis, peculiar difficulties arise in the determination of the cause of the occasional cases of poliomyelitis which arise in those to whom the vaccine is given or their close contacts. In such circumstances it cannot be said that the vaccines can be exonerated from blame either for failure to prevent natural infection or for themselves causing harmful effects. The most exacting of laboratory tests and the strictest possible surveillance

[1] *Brit. med. J.*, 1960, **1**, 1729.
[2] Koprowski, H., ibid., 1960, **2**, 85.

are clearly necessary. In any case some method of precise identification of the vaccine strains and also of their progeny is urgently needed. Certain new "markers" were described at the conference, and it may be hoped that they will prove better tools for "finger-printing" poliovirus than those studied so far. Meanwhile many will disagree with the practice adopted in the U.S.S.R. of assuming that cases of poliomyelitis developing within 21 days after feeding the vaccines are simply examples of infection with wild viruses before the vaccine virus has had time to create immunity.

Work reported at the Washington conference on the degree of spread of excreted viruses from vaccinated persons suggests that this is indeed limited. Though this itself limits the likelihood of the progeny of the vaccine viruses showing increased virulence it may also mean that the degree of immunization of the community from a single mass-feeding is deceptively small. Perhaps this is the reason for the disappointing experiences in Nicaragua and Costa Rica.

In Nicaragua, tens of thousands of doses of vaccine of all three types of poliovirus were given to children in the district of Managua before May, 1959, and one year after the occurrence of a Type 2 epidemic in the area. Yet a considerable incidence of Type 1 poliomyelitis occurred between November, 1959, and May, 1960, though those who had received oral vaccines some months before experienced a lower attack-rate than the unvaccinated. In Costa Rica similarly, a mass campaign of immunization with mono- and trivalent vaccine in 1959 was followed in the next twelve months by a disappointingly large number of cases of suspected poliomyelitis, some of which were certainly due to infection by polioviruses.

These experiences contrast with the low incidence of poliomyelitis reported thus far from areas in Europe including Czechoslovakia and Poland, as well as in the U.S.S.R., where mass immunization with oral vaccines was effected in 1959 and early in 1960. The conference was undoubtedly wise in concluding that in so variable a disease as poliomyelitis definite conclusions concerning the efficacy of live virus vaccines cannot be reached on short periods of observation.

Perhaps the difficulties already known to exist in establishing infection with the vaccine virus when the host is already infected with another enterovirus and the relatively low incidence of contact infections have been the chief reasons for the adoption of the policy of re-feeding oral vaccines to those to whom they have already been given in the U.S.S.R. Dr. Sabin's own study at Toluca, Mexico, has shown that repeated mass feeding can be used to establish infection with poliovirus even when other enteroviruses exist in the community at the time. But he has also shown that the carrier rate for polioviruses of all types in such a community quickly falls to very much lower levels than before the mass use of the vaccines. The latter may block natural transmission of wild poliovirus for a time, but the data from Mexico and also from Czechoslovakia suggest that vaccine viruses speedily disappear from the community. The duration of the herd immunity which they induce is a matter which cannot at present be assessed. With all these considerations in mind, the report of the W.H.O. Expert Committee on Poliomyelitis, which met in Washington after the conference, will be awaited with great interest.

ANEURIN BEVAN

Of all the long line of Ministers of Health since the first appointment of Dr. (subsequently Viscount) Addison in 1919, Mr. Bevan stands out towering above the rest in his impact upon the medical profession, not only because he put the final stone upon a building the foundations of which had been laid by others, but also because he attracted in the medical profession, as he did in political life, profound admiration on the one side and the sharpest antagonism on the other. His name is indissolubly connected with the National Health Service, and the impression is gained from the numerous accounts of his career and leading articles in the national press that he was its sole architect. This claim needs to be put into perspective.

The National Health Service had its roots in the National Insurance Acts introduced by another great Welsh politician, David Lloyd George, in 1911, when the controversy between the medical profession and the State was far more acrid than it was over the passing of the two National Health Service Acts in 1946 and 1947 and their coming into operation on July 5, 1948. The historian who will be able to view these events dispassionately in the future may come to the conclusion that after 1911 the principal architect of the National Health Service was the medical profession itself. Between the two wars the policy of the British Medical Association was to extend National Health Insurance in two directions —one to include the dependants of the insured, and the other to include in medical benefits consultant and specialist services. Then in the dark and forbidding days of the second world war the British Medical Association set up a planning commission to study the future development of the medical services in

[1] *Brit. med. J.*, 1942, **1**, 743.

this country; it published a draft interim report in the early part of 1942. Towards the end of the same year appeared the Beveridge Report, which was the blueprint for the Welfare State in Britain, and the medical proposals in this were obviously influenced by the draft interim report of the Planning Commission.[1] No sooner had the Beveridge Report appeared than the B.M.A. decided to co-operate with the Government in working out its medical implications on the understanding that the other recommendations of this famous document should be acted on. The B.M.A. decided to do this rather than proceed to produce a final report of its planning commission. After that the stillborn plan of Mr. Ernest Brown, as Minister of Health, was succeeded by the scheme introduced by Mr. (now Sir) Henry Willink. Negotiations between Mr. Willink as Minister of Health and the B.M.A. had reached an advanced stage when they were interrupted by the overwhelming success of the Labour Party in the Election of 1945. Mr. Bevan's Bill was placed on the Statute Book in 1946.

Bevan's Act went much further than Mr. Willink's proposals in meeting the wishes of the medical profession. Willink's proposed central medical board had wide powers over the general practitioner, including the power of appointment. It was, however, a step away from the coalition Government's proposals of 1943 that general practice should be carried on in health centres manned by whole-time full-salaried doctors with no right to private practice. On the hospital side there was strong opposition to the Willink proposals for the administration of the hospital service through joint local authorities. Aneurin Bevan's principal innovation was the settlement of this dispute by the dramatic proposal to nationalize the hospitals in this country, save a few which for special reasons were excluded.

Much of the regrettable bitterness that arose in the profession's relationship with the most brilliant Minister of Health this country has ever had arose because of the deadlock that was reached when the large negotiating committee of the profession met Mr. Bevan at the Ministry of Health early in December, 1947. Our negotiators were especially concerned with two outstanding points—the basic salary for general practitioners, and the legal ambiguity of sections 35 and 36 of the Act, referring to partnership agreements. Mr. Bevan finally had to yield on these two points, and no one can say what would have happened if he had done this on the spot at that crucial meeting in December, 1947.

It seems to us to be appropriate to put at least some of these facts on record at the time of the death of a Minister of Health whose force of character and brilliant powers of debate carried through to a provisional political conclusion an argument about the relationship of the profession and the State which is as old as civilization itself. When he became Minister of Health in 1945, Mr. Bevan made it his business to understand, so far as he could, just what kind of a profession the medical profession was. He visited hospitals and research units and discussed the problems of a health service with many individual doctors and groups of doctors. But we doubt whether he really understood the professional mind and the professional man. For him the N.H.S. was at the very centre of politics, and we believe that most medical men would think that that is not the place for a profession practising an art and pursuing a science. Aneurin Bevan was, however, much less doctrinaire than many of his colleagues in the Labour Party in his approach to the problems of the N.H.S. His N.H.S. Acts were conceived on much more liberal lines than those of the White Paper of Mr. Willink. The progressive change in a more liberal direction was undoubtedly the result of the dialogue —sometimes rather noisy—that went on between the medical profession and the Government from 1942 onwards. The dialogue will continue, and the strife and rancour that seem inseparable from political argument. The medical profession may hope to find in future Ministers of Health men with the imagination and flexibility of mind of Aneurin Bevan.

PENICILLIN FOR PAIN

An interesting list could be made of inadequate indications for which antibiotics have been given with devastating or even fatal results. They would include some of the minor catarrhal conditions for which chloramphenicol was given to subsequent victims of marrow aplasia, and the prevention of improbable sepsis after operation by means which resulted in acute staphylococcal enterocolitis or permanent damage to the eighth nerve. Even more numerous examples can be cited of the misuse of penicillin, the only dangerous effects of which occur in sensitized subjects. These come to light in reports of immediate shock following injections. C-L. Cheng and C-T. Chiang[1] reporting 10 such cases, 6 of them fatal, state the indications for the treatment, and these seem to have been adequate in only 3; among the remainder are toothache, conjunctivitis, and the common cold. A. Rosenthal,[2] analysing the records of 30 fatal cases of penicillin shock on which inquests had been held in New York City, mentions as inadequate indications for the fatal dose "sprained toe," "injury to a finger," "non-specific skin eruption," and "stasis dermatitis."

[1] Cheng, C-L., and Chiang, C-T., *Chin. med. J.*, 1956, **74**, 513.
[2] Rosenthal, A., *J. Amer. med. Ass.*, 1958, **167**, 1118.
[3] Batson, J. M., *New Engl. J. Med.*, 1960, **262**, 590.

Oral penicillin is generally credited with being safer than parenteral, and so it undoubtedly is, but J. M. Batson[3] has collected from the literature 26 records of shock-like reactions to tablets or other oral preparations of penicillin, two of which were fatal. It is perhaps significant that, in a table occupying the whole of two facing pages in which the features of these cases are analysed, none of the 17 columns refers to the indication for which the drug was given. Fortunately this omission does not extend to one of the two further cases presented by the author from the records of the New York Hospital. This was a 15-year-old girl brought to the hospital unconscious and almost pulseless after taking two penicillin tablets. She had had a tooth extracted the day before, and "because of continuing pain" had taken the tablets "obtained from her druggist by telephone order of her dentist." On the assumption that the pain was due to sepsis, this indication seems legitimate enough: the interest of the episode is in the patient's own conception of the purpose of this treatment. She had previously had injections of penicillin for pain in the knee on one occasion and for earache on two. The history continues: "Interestingly enough, she thought that penicillin was used to relieve pain." With this history her misconception is not surprising, but is it only in such immature minds as hers that a shot of penicillin is now on the same level as a tablet of aspirin?

MEDICAL ELECTRONICS

Like most technical pursuits nowadays, medicine is helped on its way by electronics. This term denotes a branch of science, or perhaps a technology, whose main concern is electrical devices that incorporate thermionic valves or their equivalent, such as transistors and the old "cat's whisker." The magnification and shaping of electric currents is the essential service which these valves perform in our television sets, hearing-aids, electronic computers, and electrocardiographs. And so well do they do it that medical and biological research as well as many diagnostic and therapeutic procedures now depend upon them at every turn.

Next week the Third International Medical Electronics Conference opens at Olympia, London, on July 21 and continues until July 27. It is organized by the Electronics and Communications Section of the Institute of Electrical Engineers and the International Federation for Medical Electronics. Among the many subjects to be discussed are instrumentation for medicine and biology; medical electronics in aviation and space flight; isotopes and radiology; the use of pills containing miniature radio transmitters; implanted cardiac pacemakers; ballisto-cardiographic techniques in the U.S.S.R. (a Russian contribution); the analysis of heart sounds and murmurs by a group of Japanese research workers; electronic aids for the blind and the deaf; the automatic control of artificial limbs; and continuous monitoring of the foetal heart. Details of registration of the conference are given on advertisement page 57 of last week's issue, and programme details may be obtained from Mr. J. L. Regan, Institute of Electrical Engineers, Savoy Place, London, W.C.2.

RECRUITMENT AND TRAINING OF CHILD PSYCHIATRISTS

Over the past decade the Royal Medico-Psychological Association has issued from its Section in Child Psychiatry a number of memoranda bearing on important aspects of psychiatric services for children and adolescents in the United Kingdom. In 1951 it showed that the consultant in child psychiatry required comprehensive basic training in general psychiatry before specialized training in child psychiatry, which should occupy three years and take place mainly at the senior registrar level.[1] The necessity for preliminary training in adult psychiatry derives both from the fact that the psychiatry of childhood, adolescence, and adult life is a continuous whole, and from the fact that psychiatric ill-health in parents plays a part in the disturbances of childhood. Equally, while stressing family, educational, social, and cultural factors in the life of childhood and the necessity for a consultant child psychiatrist being adequately informed in the appropriate branches of knowledge, the memoranda also emphasize the continuity of child psychiatry with paediatrics and general medicine.

A recent statement from the R.M.P.A. on the recruitment and training of child psychiatrists[2] assumes an expanded service in accordance with circulars issued last year from the Ministries of Health and Education[3,4] implementing the recommendations of the Committee on Maladjusted Children.[5] A realistic minimum estimate of future needs now proposed in the R.M.P.A. document is for one full-time trained child psychiatrist, with complementary junior psychiatric staff, per 200,000 of the population. This gives 200 fully trained child psychiatrists for England and Wales, 25 for Scotland, and 5 for Northern Ireland. In 1958 the equivalent of 160 full-time child psychiatrists were employed in all types of clinic, and there were then 16 senior registrar appointments in child psychiatry in the United Kingdom. In terms of the ratio of training posts to consultants this was 1 to 10, comparing unfavourably with a ratio of 1 to 5 in training posts in mental health generally and 1 to 6 in all specialties. A total of 70 further senior posts in child psychiatry are required to bring the present 160 up to the need of 230 proposed, and to staff those posts over the next five years there would be required 24 senior registrar training posts in child psychiatry additional to the 16 now in existence. The R.M.P.A. suggests that the number of senior registrar posts in existing training units should be doubled and additional training posts made in suitable clinics—that is, those offering comprehensive experience and sufficiently staffed for teaching and research.

[1] *Memorandum on the Training of the Consultant Child Psychiatrist*, 1951, Royal Medico-Psychological Association.
[2] *The Recruitment and Training of the Child Psychiatrist*, 1960. Royal Medico-Psychological Association.
[3] Ministry of Health Circular, 59(23).
[4] Ministry of Education Circular 347, 1959.
[5] *Memorandum on the Report of the Committee on Maladjusted Children*, 1957. Royal Medico-Psychological Association.

In taking one child psychiatrist for 200,000 of the population the R.M.P.A. has been "realistic and modest" to the extent of halving the original basis of one per 100,000 put forward in 1951. Much that was originally done by child-guidance clinics—namely, reassurance, advice, and explanation to parents—has now been taken over by health visitors, welfare clinics, family doctors, and paediatricians, and this is a process that must continue.[5] Child psychiatry is now, therefore, concerned not only with the milder cases of developmental and emotional difficulties which can increasingly be dealt with by other medical and associated agencies, but also with the more severe clinical syndromes to the development of which many factors have contributed. Meantime, emphasis is properly laid on attracting to child psychiatry men and women of high quality, and training them widely and well. Established in clinics, they will provide a stimulus to preventive work, a sound clinical service, and an opportunity for consultation and reference for colleagues meeting the less serious forms of disturbance in other fields of child health.

PERCUTANEOUS SPLENIC PULP MANOMETRY

One of the great problems of gastro-intestinal haemorrhage is to locate the site of the bleeding. The exclusion or confirmation of gastro-oesophageal varices as the cause of the trouble is a great help to the surgeon, and any practical aid in the differential diagnosis is of importance.

During the past decade much attention has been paid to the spleen. This work has been carried out in physiological laboratories and on patients. Recently W. F. Panke and colleagues[1-3] have reported on the combined use of splenic-pulp manometry and percutaneous splenoportography in the diagnosis of upper gastro-intestinal haemorrhage. Briefly, their technique is to insert a 14- to 18-gauge spinal needle under local anaesthesia (in the adult) through the ninth intercostal space in the posterior axillary line. This site will vary according to the size of the spleen and the configuration of the patient's chest. The needle is inserted between 1 and 3 cm. into the spleen and the trocar withdrawn; a constant drip of blood confirms the correct location. A short length of tubing is connected between the needle and a manometer through a three-way tap and syringe, the latter filled with saline to clear the needle when necessary. Manometric readings are taken and if necessary followed by splenography.

Patients without portal hypertension have an average pressure reading of 180 mm. water, with a wide variation. However, if the pressure is less than 250 mm. water it can be safely assumed that portal hypertension does not exist. If the reading is more than 350 mm. water a diagnosis of bleeding oesophageal varices can be tentatively made. This can then be confirmed by portography. Between the pressures of 250 and 350 mm. water portal hypertension may or may not exist, and portosplenography may then give some help by showing a collateral venous flow. The majority of patients who bleed from gastro-oesophageal varices have pressures in excess of 350 mm. water, and range up to 600 mm. water.[4-6] Because of great normal variation, only the high range of pressures are of clinical significance, though it would appear that when the tension is such as to produce oesophageal varices it will be demonstrable by splenic pulp manometry. In the cases reported as having bleeding from oesophageal varices, more than 50% had splenic-pulp pressures between 400 and 600 mm. water.[7] Though pressures were high in cases in which bleeding did not take place, they were significantly lower than in those cases in which it did. This diagnostic test, which can be carried out before laparotomy, may therefore assist the surgeon considerably. This is particularly so when other investigations such as oesophagoscopy, gastroscopy, and estimation of the level of ammonia in the blood are not sufficiently conclusive. As to the hazards of the technique, four cases in 200 required laparotomy for intra-abdominal bleeding.

[1] Panke, W. F., Rousselot, L. M., and Moreno, A. H., *Surg. Gynec. Obstet.*, 1959, **109**, 270.
[2] Moreno, A. H., Rousselot, L. M., and Panke, W. F., *Surg. Clin. N. Amer.*, 1958, **38**, 421.
[3] Panke, W. F., Moreno, A. H., and Rousselot, L. M., ibid., 1958, **38**, 1293.
[4] —— Bradley, E. G., Moreno, A. H., Ruzicka, F. F., and Rousselot, L. M., *J. Amer. med. Ass.*, 1959, **69**, 1032.
[5] Moreno, A. H., Chiesa, D., and Affani, J., *Surg. Gynec. Obstet.*, 1957, **104**, 25.
[6] Taylor, F. W., *Ann. Surg.*, 1946, **683**, 1957.
[7] McDermott, W. V., Jr., *New Engl. J. Med.*, 1957, **257**, 1161.

CENTRAL AFRICAN MEDICAL SCHOOL

For some years the need to establish a medical school in the Central African Federation has been acknowledged. The locality proposed is at Salisbury, Southern Rhodesia, where a teaching hospital would be set up in association with the University College of Rhodesia and Nyasaland. The Federal Government took an important step forward last week when it declared through its Minister of Health[1] that this project "is essential for the future of the health services of the Federation." Birmingham University has agreed to sponsor the medical school and award the degrees. The Minister said that the benefits of the medical school to the Federation would be far-reaching. "Not only will it provide doctors of all races for the Federation in the future, but it will be a further means of attracting medical men of the highest calibre to the Federation. Valuable research in the major diseases encountered in the Federation will be carried on in its various departments and will be an integral part of the medical school and teaching hospital."

The Minister concluded by saying that "the setting up of a medical school ought to be attained if possible," and indeed this ambitious scheme deserves every encouragement. Not the least interesting aspect of it to medical men is the proposed syllabus,[2] which has many novel features intended to integrate closely the teaching of anatomy, physiology, pathology, and clinical subjects. The Nuffield Foundation announced earlier this year the offer of £250,000 towards the establishment of the school.

[1] *Federal Assembly Hansard*, July 6, 1960, col. 1160.
[2] *Brit. med. J.*, 1959, **1**, 1024.

DOCTORS AND SCIENTISTS

MEDICAL FELLOWS OF THE ROYAL SOCIETY

Of the 612 Fellows of the Royal Society 80 have a medical qualification. The following list is arranged in the order of their election. The posts they held at the time and the work for which they were distinguished are given after each name. Portraits of Sir Henry Dale and Lord Adrian appear on p. 180. Other photographs are reproduced below.

1913

Dr. (now Professor) T. R. ELLIOTT, lecturer on practical medicine at University College, London, and distinguished for his work on the suprarenal glands and the innervation of the viscera.

1914

Dr. (now Sir) HENRY H. DALE, director of the Wellcome Physiological Research Laboratory, London, and distinguished for his physiological and pharmacological researches and particularly for his investigations of ergot and the action of extracts of the posterior lobe of the pituitary gland on the uterus.

1916

Sir LEONARD ROGERS, I.M.S., professor of pathology, Medical College, Calcutta, whose original work added greatly to the knowledge of many tropical disorders, including leprosy, cholera, kala-azar, and dysentery.

1922

Dr. C. G. DOUGLAS, Fellow and tutor in Natural Science, St. John's College, Oxford, and distinguished for his research on the physiology of respiration.

1923

Dr. E. D. (now Lord) ADRIAN, university lecturer in physiology, Cambridge, distinguished for his work on the physiology of the nervous system and the mechanism of nervous action.

Professor R. T. LEIPER, professor of helminthology in the University of London, and a leading authority on his subject, especially on bilharzia.

1925

Professor C. A. (now Sir Charles) LOVATT EVANS, professor of physiology at St. Bartholomew's Hospital, London, distinguished for his physiological investigations, particularly on the metabolism of the heart.

1926

Lieutenant-Colonel (now Sir) RICKARD CHRISTOPHERS, I.M.S., director of the Central Research Institute, Kasauli, India, and distinguished for his work on malaria.

Dr. HAMILTON HARTRIDGE, senior demonstrator in the department of physiology of Cambridge, and distinguished for his researches on the physiology of vision and other senses.

1927

Professor T. G. BROWN, professor of physiology in the Welsh National School of Medicine, and an authority on the physiology of the nervous system.

Professor J. S. B. (now Lord) STOPFORD, professor of anatomy at Manchester, distinguished for his work on sensation, the sensory pathway, and the blood supply of the brain.

1928

Professor C. HAMILTON BROWNING, professor of bacteriology in the University of Glasgow, and a leading authority on immunity.

1932

Professor FREDERICK ROBERT MILLER, professor of physiology, University of Western Ontario Medical School, and distinguished for his investigations of reflex action and other physiological studies.

Dr. JOHN (now Lord) BOYD ORR, director of the Rowett Institute for Research in Animal Nutrition, Aberdeen, and a leading authority on nutritional aspects of human and animal physiology.

1933

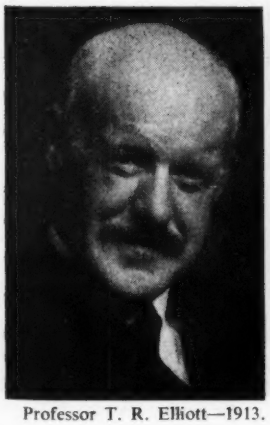
Professor J. B. COLLIP, professor of biochemistry in McGill University, Montreal, distinguished for his work on insulin and on the action of the parathyroid glands.

Dr. G. M. (now Sir Gordon) HOLMES, physician to Charing Cross Hospital and to the National Hospital for Nervous Diseases, Queen Square, and distinguished for his investigations of the anatomy, physiology, and disorders of the nervous system.

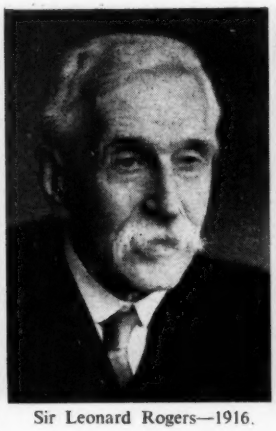
Professor JAMES WALTER MCLEOD, Brotherton professor of bacteriology in Leeds University, and distinguished for his work on bacterial oxidation and reductions.

1934

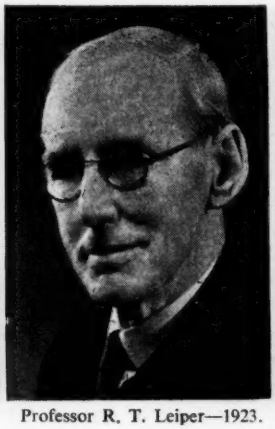
Dr. (now Sir) PAUL FILDES, research bacteriologist at the London Hospital, and an authority on chemical bacteriology.



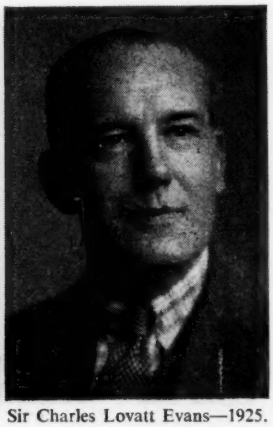
Professor T. R. Elliott—1913.



Sir Leonard Rogers—1916.

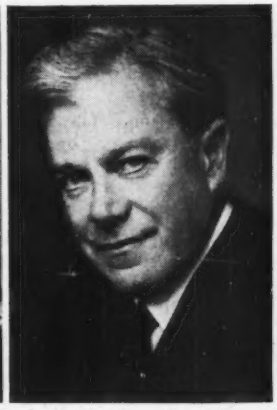


Professor R. T. Leiper—1923.

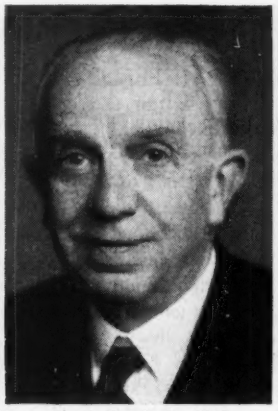


Sir Charles Lovatt Evans—1925.

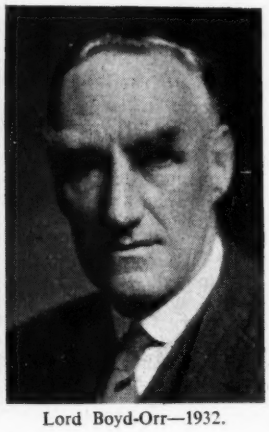
Sir Samuel Rickard Christophers—1926.



Professor Hamilton Hartridge—1926.



Lord Stopford—1927.



Lord Boyd-Orr—1932.

Dr. R. T. GRANT, lecturer in cardiac pathology to University College Hospital Medical School, and distinguished for his investigations of cardiological diseases.

1935

Professor S. P. (now Sir Samuel) BEDSON, professor of bacteriology at the London Hospital, and distinguished for his virological research and investigations of psittacosis.

Professor W. E. (now Sir Wilfrid) LE GROS CLARK, professor of human anatomy in the University of Oxford, and distinguished for his studies of physical anthropology and of the thalamus in animals and man.

Professor R. A. (now Sir Rudolph) PETERS, Whitley professor of biochemistry at Oxford, distinguished for his work on the vitamin-B complex and the metabolism of pyruvic acid.

1936

Dr. (now Professor) E. B. VERNEY, reader in pharmacology in the University of Cambridge, distinguished for his work on urinary secretion and on pituitarism.

1937

Dr. A. N. (now Sir Alan) DRURY, lecturer in pathology, University of Cambridge, distinguished for his investigation of the action of the heart.

1938

Professor C. H. BEST, professor of physiology, University of Toronto, and famed for his part in the discovery of insulin.

1939

Dr. C. H. ANDREWES, pathologist, National Institute for Medical Research, distinguished for his work on filtrable viruses and bacteriophage.

Professor F. A. E. CREW, professor of animal genetics in the University of Edinburgh, distinguished for his work on sex reversal in frogs and birds, and on the genetics of many animals.

Dr. V. B. WIGGLESWORTH, lecturer and research fellow in medical entomology at the London School of Hygiene and Tropical Medicine, distinguished for his researches on insect physiology, especially in relation to digestion, tracheal respiration, excretion, and possible endocrine secretion.

Dr. E. G. T. LIDDELL, lecturer in physiology, the University of Oxford, distinguished for his researches upon the physiology of muscle movement and posture in mammals.

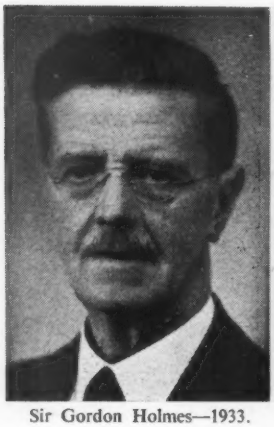
1941

Dr. J. C. (now Sir John) ECCLES, director of the Kanematsu Memorial Institute for Pathology, Sydney, distinguished for his physiological researches, which have dealt principally with excitation and transmission in the neuromuscular system.

Professor H. W. (now Sir Howard) FLOREY, professor of pathology at Oxford, distinguished for his work in general pathology, in particular on lacteals and lymphatics and on Brunner's glands.

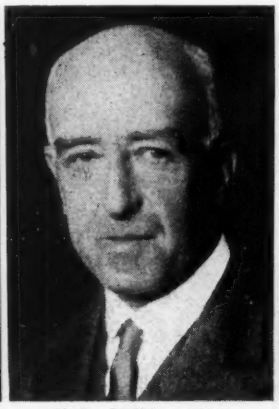
1942

Professor J. H. BURN, professor of pharmacology at Oxford, distinguished for his work in physiology and pharmacology and on the principles and methods of biological standardization.

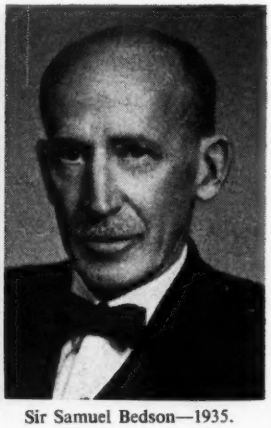


Sir Gordon Holmes—1933.

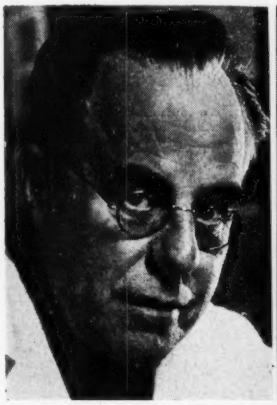
Professor J. W. McLeod—1933.



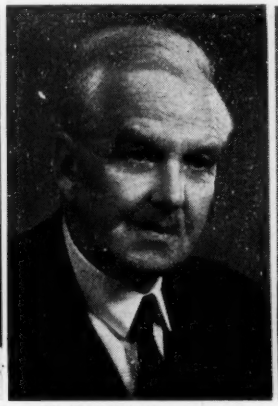
Sir Paul Fildes—1934.



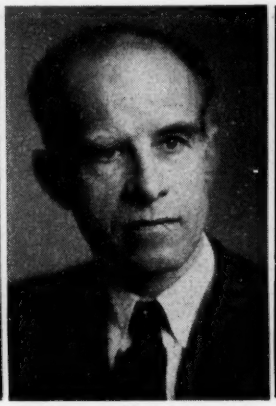
Sir Samuel Bedson—1935.



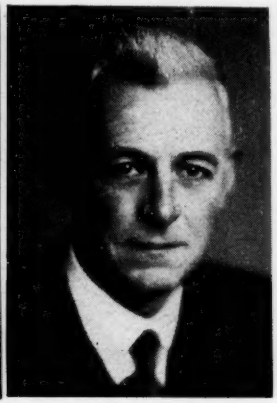
Sir Wilfrid Le Gros Clark—1935.



Sir Rudolph Peters—1935.



Professor E. B. Verney—1936.



Sir Alan Drury—1937.

Dr. F. M. (now Sir Macfarlane) BURNET, assistant director, Hall Institute for Medical Research, Melbourne, distinguished for his researches in bacteriology, especially on avian and mammalian viruses.

Professor E. C. (now Sir Charles) DODDS, professor of biochemistry, Middlesex Hospital, distinguished for his investigations in biochemistry in relation to physiology and medicine, and especially in the synthetic production of oestrogenic agents.

Colonel N. H. (now Sir Neil Hamilton) FAIRLEY, lecturer at the London School of Hygiene and Tropical Medicine, distinguished for his researches in tropical medicine.

1943

Professor I. DE B. DALY, professor of physiology, Edinburgh University, distinguished as an originator of essential items of modern physiological technique, and for his important contribution to the physiology of the circulation in the lungs and the bronchial tubes.

Professor WILDER PENFIELD, director of the Montreal Neurological Institute, distinguished for his researches in neurohistology and as a neurosurgeon.

Professor S. (now Sir Solly) ZUCKERMAN, professor of anatomy, University of Birmingham, distinguished for his studies on the morphology and relationship of the primates and their reproductive physiology.

1945

Dr. L. COLEBROOK, honorary director of the research laboratories of Queen Charlotte's Hospital, and pathological consultant to the Army, distinguished in the application of bacteriology to clinical medicine, especially for the practical establishment of the "sulpha" drugs, and for throwing much light on the fevers of childbirth.

Professor J. H. GADDUM, professor of materia medica in the University of Edinburgh, distinguished for his work on the identification and estimation of acetylcholine, adrenaline, and histamine in animal tissues and for his experimental contributions to the conception of cholinergic and adrenergic nerves.

1946

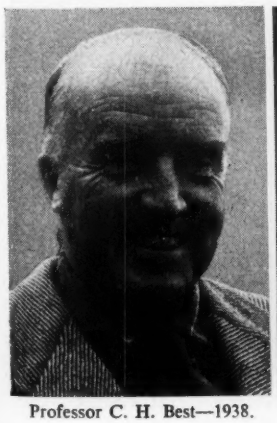
Dr. G. L. (now Sir Lindor) BROWN, scientific staff of the Medical Research Council, distinguished for his investigations in the chemical transmission of nerve impulses through sympathetic ganglia, and from nerve to skeletal muscle.

Professor G. R. (now Sir Roy) CAMERON, professor of morbid anatomy at University College Hospital Medical School, distinguished for his contributions to the knowledge of changes produced in the liver and other organs by operative procedures and by toxic chemicals.

Dr. F. M. R. (now Sir Francis) WALSHE, physician to the National Hospital, Queen Square, and physician in charge of the Neurological Department, University College Hospital, editor of *Brain*, distinguished for his physiological studies on the human nervous system by clinical investigations.

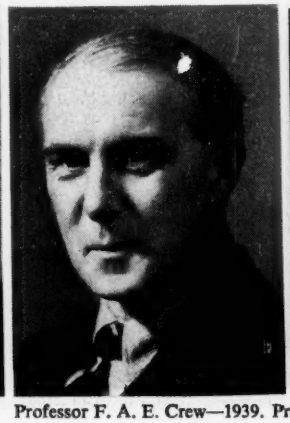
1947

Professor E. J. CONWAY, professor of biochemistry and pharmacology at University College, Dublin, distinguished for his work on chemical and

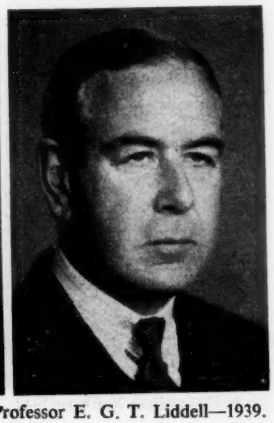


Professor C. H. Best—1938.

Dr. C. H. Andrewes—1939.



Professor F. A. E. Crew—1939.



Professor E. G. T. Liddell—1939.

Sir Howard Florey—1941.

Professor J. H. Burn—1942.

Sir Macfarlane Burnet—1942.

Sir Charles Dodds—1942.

physico-chemical processes in living tissues.

Professor G. (now Sir Geoffrey) JEFFERSON, professor of neurosurgery in the University of Manchester, distinguished for the leading part he has played in the development of the surgery of the brain and spinal cord, in the treatment of head injuries, and for his studies of the physiological disorders resulting from brain injury.

Dr. J. CRAIGIE, member of the scientific staff of the Imperial Cancer Research Fund, London, distinguished for his work on bacteriology and immunology, and especially for his studies of viruses.

Dr. W. S. FELDBERG, lecturer in physiology, University of Cambridge, distinguished for researches on the mechanism of the humoral transmission of excitation, particularly in relation to the phenomena in which acetylcholine is concerned.

Professor H. A. (now Sir Hans) KREBS, professor of biochemistry, University of Sheffield, distinguished for his work on intermediary reactions in cell metabolism.

Professor R. A. MCCANCE, professor of experimental medicine in the University of Cambridge, distinguished for his contributions to metabolic studies of human beings.

Dr. W. A. H. RUSHTON, lecturer in physiology in the University of Cambridge, distinguished for his researches on the effect of electrical stimuli on muscles and nerves.

1949

Professor WILSON SMITH, professor of bacteriology, University College Hospital Medical School, distinguished for his researches on the virus of influenza, and on the pathology of staphylococcal infections.

1950

Dr. H. E. SHORTT, head of the department of parasitology, London School of Hygiene and Tropical Medicine, distinguished for his work on protozoal diseases.

1951

Brigadier J. S. K. (now Sir John) BOYD, director of the Wellcome Laboratories of Tropical Medicine, London, distinguished for important contributions to bacteriology and immunology: his researches on the dysentery bacilli, the typhus fevers, and tetanus led to great improvements in methods of diagnosis and control measures.

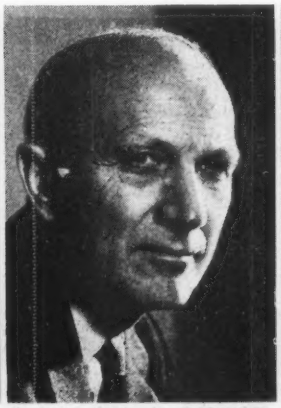
Dr. (now Professor) A. NEUBERGER, biochemist, National Institute for Medical Research, London, distinguished for his researches on the biochemistry of amino-acids and proteins.

1952

Professor J. S. MITCHELL, professor of radiotherapeutics in the University of Cambridge, distinguished for his work in biophysics and radiotherapy, and for his contributions to knowledge of the effects of radiation on metabolic processes.

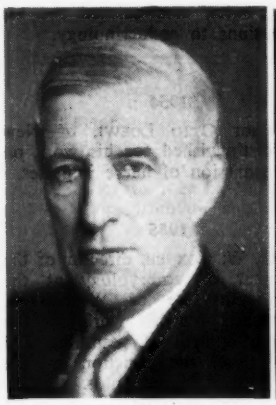
Dr. R. R. RACE, director of the Medical Research Council's Blood Group Research Unit at the Lister Institute, distinguished for the application of serological methods in human genetics, and of genetics in medicine; and for the progressive elucidation of the complicated genetical situation found in connexion with the rhesus and other

Sir Neil Hamilton Fairley—1942.

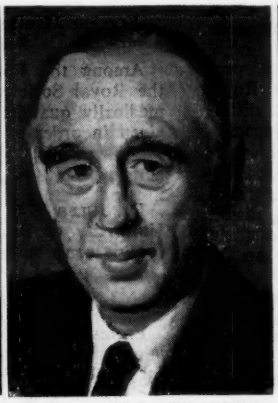

Professor Wilder Penfield—1943.

Sir Solly Zuckerman—1943.

Professor J. H. Gaddum—1945.


Sir Francis Walshe—1946.

Sir Geoffrey Jefferson—1947.


Sir Stewart Duke-Elder—1960.

Sir George Pickering—1960.

factors capable of causing haemolytic disease.

Dr. MARTHE VOGT, lecturer in pharmacology in the University of Edinburgh, distinguished for her work on the quantitative estimation of the cortical hormone in adrenal venous blood, and for her discovery of the various factors which control the output of this hormone.

1953

Professor HENRY BARCROFT, professor of physiology at St. Thomas's Hospital, distinguished for investigation of the blood supply to human muscles.

Professor LIONEL PENROSE, Galton professor of eugenics in London University, distinguished especially for his study of the factors responsible for mental deficiency and for inheritance studies in man.

Professor G. W. HARRIS, Fitzmary professor of physiology at the Institute of Psychiatry, London, distinguished for his contributions to the physiology of the hypothalamus and pituitary body.

Professor DAVID WHITTERIDGE, professor of physiology at Edinburgh University, distinguished especially for his studies of the nerves of thoracic viscera and of the external muscles of the eye.

1955

Professor A. W. DOWNIE, professor of bacteriology at Liverpool University, distinguished for his contributions to bacteriology and virology, and especially for his investigations of the viruses belonging to the smallpox group.

Professor K. J. FRANKLIN, professor of physiology at St. Bartholomew's Hospital, distinguished for the application of *x*-ray cinematography to physiological problems, for work on veins and vascular reflexes, and the history of physiology.

Sir HAROLD HIMSWORTH, secretary of the Medical Research Council, distinguished for his contributions to clinical investigation, and especially for researches into the aetiology of diabetes mellitus and liver necrosis.

1956

Dr. H. GRÜNEBERG, reader in genetics at University College, London, distinguished for his investigations into the expression of genes during development in mammals.

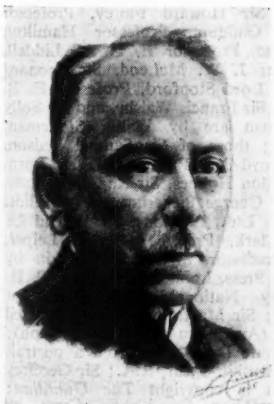
Dr. C. S. HALLPIKE, director of the Medical Research Council's otological research unit at the National Hospital, Queen Square, London, distinguished for his investigations of the physiology and pathology of the internal ear, and the mechanisms of hearing and equilibration.

Dr. R. G. MACFARLANE, Radcliffe lecturer in haematology at Oxford University, distinguished for his studies on blood coagulation and their application for the treatment of haemophilia.

Professor W. D. M. PATON, professor of pharmacology at the Royal College of Surgeons, distinguished for his work on the relation between chemical structure and pharmacological action, and for the discovery of several important new drugs.

1957

Professor S. ADLER, professor of parasitology at the Hebrew University, Jerusalem, distinguished for his researches on pathogenic protozoa


Professor Jules Bordet—1916.

Professor O. H. Warburg—1934.

Professor B. A. Houssay—1943.

Dr. H. S. Gasser—1946.

and the diseases caused by them, especially visceral and cutaneous leishmaniasis.

Professor E. C. AMOROSO, professor of physiology at the Royal Veterinary College, London, distinguished for his studies on reproduction in vertebrates.

Professor JOHN MCMICHAEL, professor of medicine at the Postgraduate Medical School, London, distinguished for his contributions to medical knowledge, especially on the mechanisms of heart failure.

Professor C. L. OAKLEY, professor of bacteriology at Leeds University, distinguished for his researches on the toxins of anaerobic bacteria of the genus *Clostridium*, and on the site of antibody production.

1958

Dr. EDITH BÜLBRING, demonstrator in pharmacology at Oxford University, distinguished for her work on smooth muscle and on the action of adrenaline.

Professor F. J. FENNER, professor of microbiology at the Australian National University, Canberra, distinguished for his work in microbiology, particularly the pathogenesis and epidemiology of mousepox and myxomatosis.

Professor A. HADDOW, director of the Chester Beatty Research Institute at the Royal Cancer Hospital, London, distinguished for his investigations into the chemotherapy of malignant disease.

Professor A. ST. G. J. HUGGETT, professor of physiology at St. Mary's Hospital, London, distinguished for his investigations on the physiology of reproduction and on the transfer of materials from mother to foetus.

1960

Professor J. N. DAVIDSON, Gardiner professor of biochemistry in the University of Glasgow, distinguished for his work on the structure, distribution, and biosynthesis of ribose nucleic acid and deoxyribose nucleic acid.

Sir STEWART DUKE-ELDER, ophthalmic surgeon and director of research at the London University Institute of Ophthalmology, distinguished for his contributions to ophthalmic medicine, pathology, and physiology.

Dr. P. A. GORER, reader in experimental pathology at Guy's Hospital Medical School, distinguished for his work on the immunological genetics of tissue transplantation.

Sir GEORGE PICKERING, Regius professor of medicine in the University of Oxford, distinguished for contributions to clinical science, in particular to knowledge of the causes of high blood-pressure

Foreign Members of the Royal Society

Among the Foreign Members of the Royal Society the following are medically qualified. The names are given in order of election.

1916

Dr. JULES J. B. V. BORDET, of the University of Brussels, distinguished for his contributions to bacteriology.

1934

Professor OTTO HEINRICH WARBURG, of the Kaiser-Wilhelm Institute for Biology in Berlin, distinguished for his work on photosynthesis, and on metabolism and respiration in cells.

1940

Dr. FRANCIS PEYTON ROUS, of the Rockefeller Institute for Medical Research, New York, distinguished for his contributions to pathology, and particularly his pioneer studies on filterable tumours and on the transmission of cancer.

1942

Professor ALFRED N. RICHARDS, professor of pharmacology in the University of Pennsylvania, distinguished for his experimental researches on the method of formation of urine by the kidney over a wide range of vertebrate types.

1943

Professor B. A. HOUSSAY, professor of physiology in the University of Buenos Aires, distinguished for his researches on endocrine glands.

1946

Dr. H. S. GASSER, director of the Rockefeller Institute for Medical Research, distinguished for his contribution to the physiology of the nervous system.

1950

Professor C. F. CORI, professor of pharmacology and biochemistry in the Washington University School of Medicine, St. Louis; distinguished for his work on metabolism of carbohydrates in the animal body.

1951

Dr. H. MCL. EVANS, of Berkeley, California, distinguished for his researches in anatomy, embryology, and particularly in the field of experimental endocrinology.

1953

Professor M. J. C. R. COURRIER, deputy director of the Collège de France, Paris, distinguished for his contributions to endocrinology.

1954

Professor OTTO LOEWI, of New York, distinguished for his work on the transmission of nerve impulses.

1955

Dr. G. W. CORNER, director of the department of embryology at the Carnegie Institute of Washington, distinguished for his work on the endocrine control of gestation, and especially on the function of the corpus luteum in mammals.

1959

Professor GERHARD DOMAGK, of Münster, West Germany, distinguished for his researches leading to the discovery of "prontosil," the first chemotherapeutic agent against septic infection.

Professor A. H. T. THEORELL, of Stockholm, distinguished for his work in the field of enzyme chemistry, particularly in relation to oxidation in animal tissues.

1960

Professor G. W. BEADLE, chairman of the division of biology, California Institute of Technology, Pasadena, California, distinguished for his outstanding contributions to genetics.

Professor R. A. GRANIT, professor of neurophysiology in Stockholm, distinguished for his researches on the physiology of vision and neurophysiology.

ACKNOWLEDGMENTS

The photographs of Dr. C. H. Andrewes, Sir Samuel Rickard Christophers, Sir Charles Dodds, Sir Alan Drury, Sir Charles Lovatt Evans, Sir Neil Hamilton Fairley, Sir Paul Fildes, Sir Howard Florey, Professor J. H. Gaddum, Professor Hamilton Hartridge, Professor E. G. T. Liddell, Professor J. W. McLeod, Sir Leonard Rogers, Lord Stopford, Professor E. B. Verney, Sir Francis Walshe, and Sir Solly Zuckerman are by Walter Stoneman, London; those of Sir Samuel Bedson, Lord Boyd-Orr, Professor J. H. Burn, Sir Gordon Holmes, Sir Rudolph Peters, and Sir George Pickering are by Elliott and Fry, Ltd., London: Sir Wilfrid Le Gros Clark, Professor R. T. Leiper, and Professor Wilder Penfield by Camera Press, London; Professor C. H. Best by National Film Board of Canada; Sir Macfarlane Burnet by Neil Murray (Australian official photograph); Sir Stewart Duke-Elder from a portrait by Mr. Ruskin Spear, R.A.; Sir Geoffrey Jefferson is copyright *The Guardian*; and Professor F. A. E. Crew by Drummond Young, Edinburgh.

Nova et Vetera

COFFEE-HOUSES AND SCIENCE

The coffee-houses which began to proliferate after the Restoration incubated insurance companies, news-letters, societies, and clubs. They also provided doctors with opportunities to meet their patients, and apothecaries to obtain advice from the specialists of the day. Their role as seed-beds of science is also not without interest. From their very beginning this can be traced. Thus Arthur Tillyard, who established a coffee-house near All Saints', Oxford, in 1655, used to entertain Millington and Peter Pett, together with early members of the Royal Society. It was at Tillyard's that Peter Staehl taught chemistry until 1662 before migrating to London and Robert Boyle's laboratory. John Houghton (d. 1705), who first noticed the potato plant as an agricultural vegetable, regarded coffee-houses as having "improved useful knowledge" as much as the universities.

Restless Robert Hooke was a great former of coffee-house clubs. At Garaway's he "taught quaker to make cantilever," discussed clock-making with Tompion, or experiments with Shortgrave, his assistant. On December 11, 1675, he and John Hoskins, F.R.S., were at Joe's Coffee House, where, said Hooke, "we began New Clubb with John Aubrey." Six months later he "contrived new Decimal Society," this time with Robert Boyle, Christopher Wren, Nehemiah Grew, Theodore Haak, and others. On July 15, 1676, the club discussed "Logarithmotechnia 'an Arithmetick Engine' and music." A third venture which he launched with Aubrey in this year was a "Rosicrucian Club" to study alchemy, but it came to nothing.

Other virtuosi would resort to coffee-houses, especially to the "Grecian," in Devereux Court. Sir William Petty, for instance, who invented the catamaran or double-hulled boat, also attended a club at the "Turk's Head," Westminster, where an amateur parliament was sustained. It was from the Grecian that Steele proposed to date his articles in the *Tatler*.

In 1695, two years after Hans Sloane became secretary of the Royal Society, his servant James Salter, aware of this universal thirst, set up a coffee-house at 18, Cheyne Walk, Chelsea. Stocked as a parody of a virtuoso's collection, it attracted great attention. Steele in the *Tatler* of June 28, 1709, commented on the "Ten Thousand Gimcracks, round the Room and on the ceiling."

A fundamental stimulus was given to mathematics by the insurance companies and lotteries (like the South Sea Bubble) that flourished at this time. At the Marine Coffee House, in Birchin Lane, the premises of the London Assurance Company till 1748, John Harris, F.R.S. (1667–1719), began in 1698 to lecture on mathematics. He continued till 1704, when his *Lexicon Technicum*, or a *Universal English Dictionary of the Arts and Sciences*, was published—the first of a long line of English encyclopaedias. Abraham de Moivre, a French exile in England and a private tutor, published his *Doctrine of Chances* in 1716. At the Rainbow Coffee House in 1735 a Society for the Encouragement of Learning "was established with the general aim of promoting the Arts and Sciences."

Several scientific societies were either formed in, or run from, coffee-houses. Johann Jacob Dillen or Dillenius (1681–1747), the Sherardian Professor of Botany at Oxford, and John Martyn (1699–1768), an amateur entomologist, formed a Botanical Society in 1721 which met at the Rainbow Coffee House, in Watling Street, but later changed to a private house and subsequently ceased to exist. An Aurelian Society similarly took shape in the Swan Tavern, in the Cornhill, in 1745, till a fire, three years later, destroyed it. In its resurrected form it used to meet at the York Coffee House, in St. James Street, and from this was formed the Linnean Society in 1788.

The President of the Royal Society in 1741, Martin Folkes (1690–1754), was such a habitué of Rawthmell's in Henrietta Street, Covent Garden, that, according to one Fellow, he chose the council and officers out of "his junto of Sycophants" that used to meet him there every night. Rawthmell's incubated an ambitious venture some thirteen years later: on March 22, 1754, a group of Fellows of the Royal Society listened to the proposals of a Northampton drawing-master to subsidize inventions by prizes, in much the same way as horse-breeding was fostered by competition at the Northampton horse fair. This drawing-master, Shipley, was anxious to find substitutes for cobalt and madder, both dyes used in the cloth trade, both imported, and both difficult to obtain. Meeting again at Rawthmell's on March 29, they decided to make their meetings more formal, and arranged to forgather regularly at a circulating library in Crane Court, Fleet Street. From this grew the Society for the Encouragement of Arts, Manufacturers, and Commerce, perhaps better known to-day as the Royal Society of Arts.

Just as these coffee-houses incubated societies, encyclopaedias, news-letters, insurance companies, and town libraries, so they provided also forum and clearing-house for new discoveries in science. At "Buttons," in Russell Street, Covent Garden, of which Martin Folkes was a member, there was a post-box where intelligence of all kinds was deposited for Addison's paper, the *Guardian*. Fashioned like a lion's head, it stood on the western side of the coffee-house, "holding its paws under the chin, on a box which contains everything that he swallows." As Addison remarked, it was "a proper emblem of knowledge and actions, being all head and paws." This "lion post-box" was later moved to the "Bedford." This was even more directly concerned with science. Here John Stirling, F.R.S., and later J. T. Desaguliers, F.R.S. (1683–1744), lectured on experimental philosophy. Stirling was a friend of Nicholas Bernouilli and Isaac Newton, and later went on to become a mine manager in Lanarkshire. Desaguliers, once a demonstrator at the Royal Society, discoursed at large over the great piazza at Covent Garden to, amongst others, the Fieldings, Hogarth, Woodward, Lloyd, and Goldsmith.

The quacks and bone-setters who frequented these places often picked up more than odd clients. Thus Joshua Ward (1685–1761), so aptly caught by Hogarth in the "Harlot's Progress," made such good use of the scraps of gossip and information he picked up that in 1736 he was able to manufacture sulphuric acid at Twickenham by the bell process. He reduced the price of this valuable commodity some sixteenfold. The local inhabitants were so offended by the smell of burning brimstone and nitre that they forced him to remove his distillery to Richmond. By 1749 he had patented his process, and by 1758, when the French metallurgist and "industrial spy" Gabriel Jars began visiting England, he noticed that Ward was employing Welsh women, probably so that the secret of his work would not be divulged.

A more respectable chemist, Dr. Morris had an "elaboratory" at Robert's Coffee House in the Great Piazza, Covent Garden, where a number of crucibles were tested in 1757. By 1782 a Chemical Society was meeting at the Chapter Coffee House in London.

So not without reason have these coffee-houses appeared to a twentieth-century sociologist to be the first new form of amalgamation in a mass society.

W. H. G. ARMYTAGE.

BIBLIOGRAPHY

E. F. Robinson, *The Early History of Coffee Houses in England*, 1893. Kegan Paul, London.
Aytoun Ellis, *The Penny Universities: A History of the Coffee-Houses*, 1956. Secker and Warburg, London.
G. H. Turnbull, "Peter Staehl, the First Public Teacher of Chemistry at Oxford," *Ann. Sci.*, 1953, **9**, 265.
M. 'Espinasse, *Robert Hooke*, 1956. Heinemann, London.
A. T. Gage, *A History of the Linnean Society of London*, 1938. Printed for the Linnean Soc. by Taylor and Francis Ltd.
Stuart Piggott, *William Stukeley*, 1950. Oxford.
Derek Hudson and K. W. Luckhurst, *The Royal Society of Arts, 1754–1954*, 1954. John Murray, London.
Karl Mannheim, *Essays on the Sociology of Culture*, 1956, 138 ff. Kegan Paul.

FOURTH INTERNATIONAL GOITRE CONFERENCE, LONDON, JULY 5 TO 8

[FROM A SPECIAL CORRESPONDENT]

The conference on the thyroid gland that has just taken place in London was certain to be of outstanding value and interest, since it represented the first meeting of the International Goitre Conference since 1938, and a great deal has happened in this field since then. In the event, it was impressive in a number of ways: for the attendance of so many leading clinicians and investigators; for the highly critical and authoritative nature of so many of its papers; and for the relevant and formative type of discussion that they gave rise to, both in and out of the conference rooms. This is a stimulus that should not wait for another 22 years before being repeated.

The meetings were held in Church House, Westminster, with two streams of papers running simultaneously. They afforded a striking survey of the number of problems within this limited field in which useful progress is being made, not only by the use of new techniques of investigation but also, as noted by Sir CHARLES HARINGTON in his opening address, by the development of fundamental ideas on the metabolic activity of tissues and their application in the study of thyroid function. The main emphasis was on investigation of clinical conditions rather than on their description or treatment. In this sense the discussions on the findings in Hashimoto's thyroiditis, on thyroxine-binding protein, and on the results of assays for normal and abnormal thyrotropic hormone were particularly interesting as showing the way in which current inquiry is broadening the interpretation and refining the diagnostic criteria of familiar "diseases" of the gland. The perspective of progress on thyroid problems was further developed by Sir GEOFFREY KEYNES in his accomplished memorial lecture to Sir Thomas Dunhill and in the address of the late Dr. EDWIN RAMSDELL, which was read by Dr. HOWARD MAHORNER, his successor as president of the American Goiter Association.

It is not possible here to give more than an outline of some of the subjects discussed. Abstracts of the individual papers, over 100 of which were presented, have already been published.[1] The full texts will be published later.[2]

Causes of Sporadic Goitre

From the sessions on sporadic goitre, it is clear that the causes of this condition remain obscure in the majority of cases, although useful evidence was produced on occasional factors involved—natural goitrogens in the diet, their transmission in milk, and the derivation of one of them (goitrin) from its ingested precursor. The genetics of thyroid enlargement are becoming a little clearer, particularly when the goitre is associated with congenital deafness or with the recognizable defect involving failure to remove iodine from the iodotyrosines. The form of goitre associated with, and perhaps compensating for, an unduly high renal clearance of iodide was described, although the frequency of this condition was in debate. A deficiency of iodine available to the gland, due to whatever reason, remains an unlikely cause for the majority of sporadic goitres.

In the histology and histochemistry of the gland, two studies were notably elegant: Dr. J. D. FELDMAN'S series of electron-microscopic photographs of the iodine-deficient thyroid in the rat, which appeared to bring structure and biochemical functions closer together in an arresting fashion; and the work from Professor C. P. LEBLOND'S laboratory in Canada on the transfer of protein, presumedly thyroglobulin, labelled with tritium-tagged leucine and localized by autoradiography in its gradual passage from the cell to the colloid during the initial hours after the administration of leucine to mice.

Thyroid Cancer

The session on thyroid cancer was important for the numerous and extensive surveys of the frequency of the different types of primary neoplasm involving the gland, and striking for the high frequency of differentiated growths (papillary, follicular, or adenocarcinomatous) reported in the three major series, figures amounting to 91%, 79%, and 85%—a far higher proportion than usually recognized. An interesting report by Dr. B. WALTHARD indicated that the incidence of thyroid cancer in Switzerland has not changed since the introduction of iodine prophylaxis for goitre, but more differentiated and fewer anaplastic tumours of the gland are now seen. Dr. T. WINSHIP'S paper gave further strong evidence of the induction of carcinoma, usually of a differentiated nature, by therapeutic radiation of the neck in childhood, with a mean latency of 8.7 years in 184 cases. Arrest or regression of differentiated tumours following administration of thyroid hormone was described by Dr. C. G. THOMAS, and discussion centred on the frequency with which this change could be observed, Dr. Thomas having seen regression in most of seven such tumours treated, while only four instances of regression had been seen in 100 patients treated at Houston. The treatment of thyroid cancer was not otherwise discussed at any length.

Evidence was produced that the number of patients at present known to have developed leukaemia after treatment with radioiodine for thyrotoxicosis does not exceed the number expected by chance if radioiodine had not been given.

Hashimoto's Thyroiditis and Thyroxine-binding Proteins

The histological changes and serum reactions in Hashimoto's thyroiditis were discussed most usefully and at some length. The cytotoxic effect of the serum from patients with this disease upon human thyroid cells in tissue culture was dealt with in two papers, and well illustrated by one of Professor R. J. PULVERTAFT'S engaging and convincing films. The curious and complex immunological changes in this important condition are becoming clearer, but none of them has yet been found to be specific, all occurring with varying frequency in other thyroid diseases in which the characteristic histological changes in the gland do not develop.

Another subject discussed which at present is of research interest but seems likely to become of some clinical importance was thyroxine-binding protein. Variations in the capacity of the serum proteins to bind thyroxine affect the concentration of free thyroxine which is metabolically available. A normal protein-bound iodine concentration in the serum would therefore imply an abnormally high level of free thyroxine if thyroxine-binding proteins were reduced in amount. Progress was reported from a number of centres on the study of thyroxine-binding protein fractions, on tests for their abnormality, and on the clinical conditions in which they may be raised or reduced in the serum.

Thyrotropic Hormone

The investigation of abnormal, or delayed-action, thyrotropic hormone in human serum is also reaching a stage of increasing consistency of findings but without final clarification of their meaning. Several laboratories were reporting concentrations of this hormone in the sera of thyrotoxic patients which were abnormal in kind rather than in amount, and which caused a delayed rather than an immediate stimulation of the thyroid of test animals into which the serum was injected. Little progress was reported, however, on chemical differences between these forms of the hormone, or on their relationship either to normal and increased thyroid function or to the development of exophthalmos.

Much new work was presented also on the action of antithyroid drugs, on thyroid enzyme systems, on the metabolism of the thyroid hormones and their derivatives, and on the kinetics of thyroid function in endemic goitre. There were a few papers, but surprisingly few, on thyrotoxicosis and myxoedema. The conference as a whole dealt with laboratory analysis rather than clinical observation or therapy, with mechanism more than with management of patients, and with the thyroid disease of to-morrow rather than of to-day. In the main, however, the papers were of immediate relevance to human disease, and their discussion was consistently critical and well informed.

[1] *Excerpta Medica, International Congress Series*, No. 26.
[2] To be published by Pergamon Press.

POISONING FROM ORGANO-PHOSPHORUS COMPOUNDS USED IN AGRICULTURE AND HORTICULTURE

We have been asked by the Ministry of Health to publish the following note which has been prepared by a medical panel of the scientific subcommittee of the Advisory Committee on poisonous substances used in agriculture and food storage.

In current commercial practice a large number of organo-phosphorus preparations are widely used both in agriculture and horticulture (including glass-house crops). In the open, most spraying is carried out between May and September, whereas under glass it may be done at any time of the year.

Those organo-phosphorus compounds most likely to cause trouble are scheduled in the Agriculture (Poisonous Substances) Regulations. (These include: amiton; demeton; demeton-methyl; dimefox; "gusathion"; mazidox; mipafox; parathion; "phosdrin"; phosphamidon; schradan; sulfotep; T.E.P.P.) Nevertheless the less toxic, unscheduled materials could themselves cause poisoning if misused after the unsafe use of a more toxic organo-phosphorus compound had led to symptomless overexposure —e.g., cholinesterase depression.

Pharmacology

Their fundamental action in man is to depress cholinesterase enzyme activity. Acetylcholine accumulates at the autonomic synapses and at the endings of the post-ganglionic parasympathetic and the skeletal efferent nerves. The toxic effects resemble those of physostigmine (eserine) and neostigmine ("prostigmin"), but with some compounds may be much more persistent, lasting for a day or two rather than hours. Successive hours or days of unsafe use may cause progressive lowering of the cholinesterase enzyme level.

Toxic Effects

The first symptoms of intoxication are usually anorexia and nausea, often with mental confusion and a sense of unreality. They may be experienced during exposure or up to eight hours later. Vomiting, cramp-like abdominal pain, excessive cold sweating, and salivation soon follow. Giddiness, apprehension, and restlessness may also be noticeable. (Constriction of the pupil may be seen, but this is not a constant sign of poisoning, nor is it an indication of its severity. It may be caused by the local effect of spray mist in the eye.)

As poisoning progresses, muscular twitchings begin in the eyelids and tongue; then other muscles of the face and the neck become involved. Generalized twitching with profound muscle weakness occurs in severely affected persons, as do convulsions. Later manifestations include diarrhoea, tenesmus, involuntary defaecation, and pulmonary oedema with bronchoconstriction. Ataxia, tremor, convulsions, drowsiness, respiratory depression, and mental confusion follow, gradually advancing to coma.

Management and Treatment

Atropine

Whenever possible, a blood sample should be obtained (see below) before starting treatment. The skin is usually the most important route of absorption. All clothing that might be contaminated should be removed at once, and exposed areas of skin (hands, arms, face, and neck) thoroughly washed with soap and water.

At the same time, an injection should be made of atropine sulphate, in the high dose of 2 mg. (1/30 gr.), by the intramuscular or subcutaneous route. In mild cases this may be enough in itself. If the symptoms are not promptly relieved or if the condition of the patient deteriorates—e.g., with the development of incipient convulsions or respiratory depression—further atropine is required at frequent intervals (10–30 min.), and a specific cholinesterase reactivator should be given. The use of such an agent becomes a matter of urgency if the patient has failed to respond even after 10 mg. of atropine, as the probability is that, if a specific reactivator is given more than 12 hours after the onset of symptoms, it will not be so effective.

Under no circumstances should atropine injections be delayed until cholinesterase reactivators are available, but should be continued until signs of atropinization occur—i.e., dilated pupils, dry mouth, and rapid pulse. The patient should be kept fully atropinized and under observation for at least 24 hours, preferably in a hospital, and if symptoms return after the cessation of atropine treatment further atropine should be given. Persons suffering from organo-phosphorus poisoning tolerate more atropine than do normal persons. In severe cases, very large amounts, 100 mg. or more, of atropine may be required over the full period.

Cholinesterase Reactivator

It is essential that the cholinesterase reactivator should be given intramuscularly or intravenously as early as possible and preferably at the same time as the atropine. Two such agents are available—namely, P2S and P2AM (or PAM). The recommended initial dose of P2S is 1 g. dissolved in 5 ml. of water for injection *B.P.*, which can be used intramuscularly and intravenously. Further 1 g. doses of P2S or P2AM (PAM) may be necessary at intervals of 3–4 hours.

In cases of this emergency supplies of P2S may be obtained from any of the centres which have been established throughout the country. These are listed below.

Maintain Respiration

Careful watch must be kept on the respiration. With these treatments there should be no respiratory depression. If it does occur, pulmonary ventilation must be maintained by any of the recognized artificial means. Some simple mechanical device—e.g., a positive-pressure bellows resuscitator—will give better results than ordinary manual methods. In severe cases, and especially if treatment has been delayed, there may be excessive mucous secretion combined with broncho-constriction, which will tend to block the airway. Care must be taken, therefore, to keep the airway clear, and it may be necessary to pass an endotracheal tube or perform tracheotomy. *This is most important.* The passage of an endotracheal tube and bronchial aspiration should not be delayed if there is any evidence of interference with the airway.

Laboratory Diagnosis

Diagnosis of poisoning by organo-phosphorus compounds can be confirmed by demonstrating a much-reduced cholinesterase activity in the whole blood, red blood cells, or in the serum. *A blood test should be made in every suspected case.* For this purpose 5 ml. of venous blood should be taken into a dry syringe, free from spirit, and expelled gently (to avoid haemolysis) into a tube containing an anticoagulant (e.g., a mixture of potassium and ammonium oxalates or heparin) and shaken gently. It should be sent to one of the laboratories listed below.

A reduced level of cholinesterase activity in the blood indicates that an anticholinesterase chemical has been absorbed. If the depression is marked, the patient will be more susceptible to the effects of further exposure to an organo-phosphorus compound. Any person who has been detectably affected should not therefore be allowed to return to work or to come into contact with any organo-phosphorus compounds until his whole blood-cholinesterase activity has returned to at least 70% normal. The rate of recovery of cholinesterase activity in the blood varies according to the chemical responsible. Complete recovery under certain

circumstances may take two or three months. It is therefore advisable for an affected person to have further blood examinations made every 7–14 days until recovery has been established.

Suppliers of P2S

Region 1. Newcastle	
The Pathological Laboratory, Cumberland Infirmary, Carlisle.	Carlisle 22332.
The Dispensary, Newcastle General Hospital.	Newcastle 35211.
Region 2. Leeds	
Castle Hill Hospital, Cottingham, Hull.	Cottingham 47372.
Seacroft Hospital, York Road, Leeds.	Leeds 648164.
Region 3. Sheffield	
Nottingham City Hospital, Hucknall Road, Nottingham.	Nottingham 63361.
Region 4. East Anglia	
Regional Transfusion Centre, Government Buildings, Brooklands Avenue, Cambridge.	Cambridge 56912 (8.30 a.m. to 5.30 p.m. Mondays to Fridays and 8.30 a.m. to 12.30 p.m. Saturdays). Cambridge 56913 at times other than those stated above.
Norfolk and Norwich Hospital, St. Stephen's Road, Norwich, Norfolk. NOR 53 A.	
Region 5. North-west Metropolitan	
Edgware General Hospital.	Edgware 2381.
Region 6. North-east Metropolitan	
North Middlesex Hospital, N.18. Day Chief Pathologist. Night—Resident Pathologist.	Edmonton 3071.
Chelmsford and Essex Hospital, London Road, Chelmsford. Dr. J. W. Lacey, Group Pathologist.	Chelmsford 3481.
Region 7. South-east Metropolitan	
South London Transfusion Centre, South-east Sub-Depot, David Salomon House, Southborough, Nr. Tonbridge.	Southborough 1480.
Day Service	(Maidstone 4463).
Night Service	(Maidstone 4660).
Kent and Canterbury Hospital, Ethelbert Road, Canterbury.	Canterbury 2291.
Region 8. South-west Metropolitan	
South London Transfusion Centre, Stanley Road, Sutton, Surrey.	Vigilant 8221.
Region 9. Oxford	
Northampton General Hospital.	Northampton 4680.
Royal Berkshire Hospital, Reading.	Reading 81721.
Region 10. South-western	
Ham Green Hospital, Bristol.	Pill 31165.
Pathological Department, Royal Devon and Exeter Hospital, Exeter.	Exeter 73519. Exeter 72261 (when Laboratory closed).
Scott Isolation Hospital, Plymouth.	Plymouth 64311.
Pathological Department, Royal Cornwall Infirmary, Truro.	Truro 3081.
Region 11. Wales	
Cardiff Isolation Hospital, Cardiff.	Cardiff 21466.
West Wales General Hospital, Glangwili, Carmarthen.	Carmarthen 6733.
Aberystwyth General Hospital.	Aberystwyth 374.
Caernarvon and Anglesey General Hospital, Bangor.	Bangor 1181.
Maelor General Hospital, Wrexham.	Wrexham 3512.
Region 12. Birmingham	
The Dispensary, Worcester Royal Infirmary, Worcester.	Worcester 27122. After 8 p.m.—Night Superintendent, all other times—Matron.
The Dispensary, Royal Salop Infirmary, Shrewsbury.	Shrewsbury 2056. Pharmacist on call at the hospital.
The Dispensary, County Hospital, Hereford.	Hereford 4201. Medical Officer on duty.
The Dispensary, Staffordshire General Infirmary, Stafford.	Stafford 753. Medical Registrar.
The Dispensary, Selly Oak Hospital, Birmingham.	Selly Oak 1361. After 8 p.m.—Night Superintendent, all other times—Matron.
Region 13. Manchester	
The Dispensary, Manchester Royal Infirmary.	Ardwick 3300.
Region 14. Liverpool	
Fazakerley Hospital, Longmoor Lane, Liverpool, 9.	Aintree 2342.
Region 15. Wessex	
Royal Portsmouth Hospital, Commercial Road, Portsmouth.	Portsmouth 2103.
The Dispensary, Royal South Hants and Southampton Hospital.	Southampton 26211.
Royal Victoria Hospital, Shelley Road, Bournemouth.	Boscombe 35201.

Blood Cholinesterase Estimations

These laboratories can carry out estimations of the *cholinesterase activity* of blood samples: Department of Pathology, Memorial Hospital, Peterborough. Group Laboratory, Lewisham Hospital, Lewisham, London, S.E.13. Central Laboratory, Milton Road, Portsmouth. Department of Pathology, Selly Oak Hospital, Birmingham, 29. Department of Pathology, Royal Infirmary, Worcester.

Dispatch Instructions.—To comply with the Inland Postal regulations, specimens of blood must be sent by letter post—*not* parcel post or sample post—packed in the manner described below, and conspicuously marked FRAGILE WITH CARE and bearing the words PATHOLOGICAL SPECIMEN (AGRICULTURAL POISON). A note should accompany each specimen giving (*a*) the name and age of the patient; (*b*) an indication of the degree of exposure to the poison, naming it if possible; and (*c*) details of any symptoms which may be referable to such exposure. Specimens must be enclosed in a receptacle, hermetically sealed or otherwise securely closed, and this receptacle must itself be placed in a strong wooden or metal case (or other case which has been approved by the Post Office) in such a way that it cannot shift about, and with a sufficient quantity of some absorbent materials (such as sawdust or cotton wool) so packed about the receptacle as absolutely to prevent any possible leakage from the package in the event of damage to the receptacle.

A new sound and colour, 16-mm. film entitled "That They May Live" presents the latest advances in training aids for direct artificial respiration. The comparative effectiveness of the various methods of artificial respiration is demonstrated in a laboratory sequence. The application of direct artificial respiration is then shown in a series of simulated emergencies in which prompt resuscitation would be crucial to the saving of a life. The emergencies include a collision between two cars (sternal injury and respiratory obstruction); the capsize of a boat (drowning); a child trapped in an abandoned icebox (suffocation); an infant covered with a plastic bag (suffocation); an electrocution on a pole top; a choking scene (aspiration); and an electrocution at a fun fair. The film includes classroom-type demonstrations which show how a clear airway is established, and how direct artificial respiration is performed. Copies of the film, which runs for 28 minutes, are available on free loan from the Medical Information Department, Smith & Nephew Ltd., Bessemer Road, Welwyn Garden City, Hertfordshire.

British Medical Association

ANNUAL MEETING, TORQUAY, 1960

SUMMARY OF PROCEEDINGS

THE SECTIONS

SECTION OF RADIOLOGY

Thursday, June 23

Neoplasms of the Urinary Tract

With the president, Dr. E. ROHAN WILLIAMS (London), in the chair, Dr. J. H. MIDDLEMISS (Bristol) discussed the diagnosis of kidney tumours. The Wilms tumour in children presented as an abdominal mass, usually unilateral. The diagnosis presented no difficulty, although secondary deposits were often present at the time of diagnosis. The chief function of radiology was to determine the presence of a mass, which might be seen on the plain films. Distortion of the calices or pelvis seen after intravenous and retrograde pyelography might be enough to establish the diagnosis. The distinction between neoplasms and cysts was sometimes difficult and abdominal aortography could help—the vascular pattern of the two conditions being completely different. Sometimes puncture of the mass under fluoroscopic control after intravenous pyelography was helpful: if straw-coloured fluid was obtained, this indicated a cyst and the fluid might be partly replaced with contrast medium. In the speaker's experience the diagnosis was usually fairly simple once the patient had come to hospital, but there was frequently a delay of six months or more before the patient was referred. Often secondary deposits were already present when the diagnosis was made.

Vesical Neoplasms

Dr. J. BLAIR HARTLEY (Manchester) discussed tumours of the urinary bladder and stressed the fact that radiology was important for the demonstration rather than the diagnosis of these tumours. A tumour was sometimes detected on the plain film by the presence of characteristic calcification. Other pelvic calcifications, such as fibroids or dermoid cysts, presented a different appearance. Extrinsic lesions such as carcinoma of the ovary or cervix uteri might also involve the bladder. He indicated the usefulness of the "squat shot," a modified view of the pelvic outlet used to examine the lower ends of the ureters after intravenous pyelography. The radiological demonstration of bladder tumours was of value in assessing subsequent deep *x*-ray therapy, but the movements of the bladder must be borne in mind. The patient was examined both prone and supine, and fixed metal markers were used to determine the alteration in position of the tumour when the patient was turned. This enabled the radiotherapist to plan his treatment through different ports of entry.

Surgical Treatment

Mr. H. G. HANLEY (London) thought that surgery should be used for all localized lesions. Either the lesion or the surgical treatment might interfere with the passage of urine, and the surgery of this region was largely the problem of maintaining urinary flow. Fluoroscopy with the image intensifier was valuable in the study of the physiology of the calices, for a neoplasm interfered with the normal movements. Arteriography gave a clear-cut diagnosis between neoplasm and cyst in the obvious cases, but it was not so simple in the early lesions. He had recently seen three cases in four months in which cysts had subsequently been found to contain a carcinoma. All masses should be surgically explored and, if possible, removed. After removal post-operative deep *x*-ray therapy was advisable.

Although all were agreed that the surgical approach should enable the renal vein to be tied first, in fact this was not very often done. Growth in the renal vein or inferior vena cava should be removed, but this carried the risk of air embolism. Papillary tumours of the pelvis of the ureter required the removal of the kidney and ureter to the level of the bladder, followed by regular cystoscopy for the rest of the patient's life. Carcinoma of the prostate could not be cured by hormones or by radiation; if possible cystectomy should be performed before the tumour had spread through the capsule of the gland; this meant early diagnosis. For carcinoma of the testicle Mr. Hanley advocated the removal to the inguinal ring, followed by deep *x*-ray therapy. He did not attempt to remove abdominal glands as practised in America. Carcinoma of the urethra was uncommon, and Mr. Hanley advocated excision followed by radiotherapy—in the female using local implantation. For carcinoma of the penis he thought the best treatment was surgical removal, although radiation therapy might be used for the distal half.

Treatment of Vesical Cancer

When discussing carcinoma of the bladder, he thought that the statement that treatment was just as good as it was 30 years ago was probably true. He divided carcinomas into four groups: (1) Those involving the mucosa; (2) those involving muscle but not passing through it (these two groups are best treated by excision); (3) a group including those growths which passed through the muscle (he advocated supervoltage treatment, possibly with partial cystectomy) and (4), a group containing those cases which invaded adjacent organs, the treatment being deep *x*-ray therapy, followed possibly by excision later. For small papillomas he advocated biopsy and complete obliteration by diathermy immediately. These should be seen to be eradicated on follow-up examination in two months. Mr. Hanley did not advise intracavity irradiation. When the ureters had to be diverted he advocated transplant into the pelvic colon in the elderly; in the middle-aged he suggested colostomy, with implantation of the ureters into the dry end of the bowel.

Neoplastic Invasion of the Female Urinary Tract

Professor J. C. MCCLURE BROWNE (London) spoke about the involvement of the urinary tract in gynaecological neoplasms. The ureters might be compressed by pelvic masses or involved in operations. The urethra might be compressed by cervical fibroids which might cause a complete block when these became swollen during menstruation. Over 50% of gynaecological malignant growths showed evidence of urinary lesions or obstructions. Many benign lesions could also do this, though the urinary tract might return to normal after treatment. This was not so in malignant cases. Approximately one-half of those dying from carcinoma of the cervix died as a result of urinary obstruction causing uraemia or pyelonephritis. He mentioned how the injection of vital blue into the cervix followed by open abdominal operation demonstrated the lymphatic spread along the ureters. The five-year survival rate was affected by urethral involvement. Over 60% of ovarian tumours showed involvement of the ureter. The ureters might also be involved by spread from carcinoma of the body of the uterus. He stressed that there was always a risk to the ureters during operations in this region—for instance, the removal of fibroids. For all cases of tumours in this region investigation of the urinary tract was most important, and for those cases in which there was urinary involvement radiation was required for cure, while surgery dealt with the obstruction.

Radiotherapy of Urological Growths

Dr. MARGARET D. SNELLING (London) discussed the radiotherapeutic treatment of tumours of the kidney and ureter. Hypernephroma accounted for 90% of 158 new cases. Results on the whole were poor, even though some cases

came early. Operation should be followed by radiotherapy. Some 60% of these patients died within five years, and some patients might die up to 20 years later from secondary deposits. It was obvious that metastasis must already have been present in many cases before the diagnosis was made. Radiotherapists thought ligature of the renal vein to be most important. The treatment of Wilms tumour was surgery, with ligation of the renal vein, and then radiotherapy. Some 40% might survive five years.

Dr. R. C. TUDWAY (Bristol) spoke about the radiotherapeutic treatment of neoplasms of the bladder, urethra, and penis. Bladder tumours should be excised if possible. Unfortunately bladder tumours were resistant to radiation and a normal bladder would not tolerate radiation well. An inoperable tumour might be rendered operable by radiation. Lesions up to 5 cm. in diameter might be treated by local implants of radon seeds, gold, or tantalum wire. When spread occurred or when the patient's condition was poor, one could only give palliative deep *x*-ray treatment followed by a dose of about 4,000 r to a large area. He advocated supervoltage therapy at 2 million or more volts, or the linear accelerator at 4–8 million volts. The difficulty was adequately to irradiate the tumour but not to over-irradiate adjacent vital structures. Tumours of the penis and urethra gave good response to high doses of radiation, but this was difficult in practice, and surgery was best if this could be carried out. The distal penis might be treated with a cylindrical mould or by external radiation and the use of wax blocks; the latter treatment had considerable advantages to the staff in reducing their radiation dose. Carcinoma of the male urethra was fortunately rare now that strictures were less common.

SECTION OF CARDIOLOGY

Friday, June 24

Endogenous Hormones and Congestive Heart Failure

With the president, Dr. PAUL WOOD, in the chair, Dr. E. M. DARMADY (Portsmouth) opened a symposium on the influence of endogenous hormones on the mechanism of congestive heart failure. Speaking about the renal effects of hormones on cardiovascular disease and hypertension he said that for many years salt-free diets had been known to be of value in the treatment of cardiac failure and sometimes of hypertension. The adrenal and pituitary glands were concerned in the control of salt metabolism, while mercurial diuretics had for long been used to treat cardiac failure: they acted by promoting loss of sodium chloride by the renal tubule. The new technique of autoradiography of the isolated nephron had shown that mercury acts specifically upon the proximal convoluted tubule. In cases treated with mercurial diuretics fatty degenerative changes in the tubules had been found at necropsy in the same area as radioactive mercury. Autoradiographic studies had indicated that hydrochlorothiazide was located in both the proximal and the distal convoluted tubules, suggesting that it acted at those sites. Pitressin, which controls the reabsorption of water, had been located in the distal convoluted tubule and to a lesser extent in the collecting tubule.

Aldosterone production was increased in cardiac failure, and this resulted in increased reabsorption of the sodium ion from the renal tubule. Microdissection showed that in patients dying with primary aldosteronism there was marked vacuolation of both proximal and collecting tubules, which in some ways correlated with the site of action of chlorothiazide. Spirolactone neutralized the effects of aldosterone, probably by blocking the reabsorption of sodium, and might be of value in removing oedema when this had become resistant to diuretics.

Dr. Darmady concluded by saying that the technique of autoradiography promised to be a useful tool for the location of the site of action of hormones on the kidney.

Aldosterone and Cardiac Failure

Dr. I. H. MILLS (London) described experiments which showed that production of aldosterone was increased when the extracellular volume fell, and vice versa. Work on dogs showed that changes in blood volume were monitored by two different sets of receptors. Baroreceptors on the carotid artery caused a rise in aldosterone secretion when the pulse pressure fell, but a rise in pulse pressure did not cause the aldosterone level to fall. Increase in caval pressure and right atrial stretching caused a rise in aldosterone production which fell when the constriction was released. The vagus carried the impulses which were concerned in the fall in aldosterone secretion, and the atrial receptors worked via the baroreceptors.

In heart failure the tendency for a low pulse pressure favoured a rise in aldosterone secretion, but this was not always the case. Aldosterone secretion was usually raised in right ventricular congestive failure in which the right atrium was stretched, but not in left ventricular failure, perhaps because a "turn off" mechanism operated via atrial receptors.

Dr. Mills concluded by stressing that aldosterone was not the only, or even the most important, factor concerned with oedema formation: independent mechanisms were certainly present.

Adrenal Cortical Steroids in Heart Failure

Professor T. B. COUNIHAN (Dublin) said that the role of glucocorticoids was uncertain in congestive heart failure, but that they were useful in the treatment of acute rheumatic carditis, collagen disorders involving the heart, certain forms of pericarditis, and pulmonary heart disease with wheezing. There was a small place for the cautious use of cortisone in advanced congestive heart failure with low cardiac output and resistance to diuretics, but when steroids were used they should be withdrawn slowly and covered by A.C.T.H. to prevent sudden circulatory collapse due to adrenal exhaustion. Spirolactone, by antagonizing the action of aldosterone, was sometimes effective in re-establishing diuresis in oedematous patients. It had little diuretic action of its own and consequently must be used with diuretics. Potassium supplements were required if chlorothiazide was given, but not with mersalyl.

In discussion Dr. D. VEREL (Sheffield) said that aldosterone output was found to be normal in congestive heart failure in the absence of any previous treatment. After conventional diuretic treatment aldosterone output increased both in normal control subjects and in patients with congestive heart failure. Dr. Verel doubted the importance of aldosterone in the genesis of congestive heart failure and suggested that the rise in aldosterone output in heart failure was due to salt "depletion."

Dr. P. H. DAVISON (Birmingham) and the PRESIDENT asked Dr. Mills why oedema did not occur in all patients with an elevated central venous pressure and enlargement of the right atrium. Dr. WOOD asked if any difference in aldosterone production had been found in aortic stenosis and aortic incompetence. In reply Dr. MILLS said that these questions underlined his view that the importance of aldosterone in heart failure should not be exaggerated. No difference had been noted between aortic stenosis and incompetence with regard to aldosterone secretion.

Problems of Mitral Valve Disease

The symposium was followed by a panel discussion on current problems relating to mitral valve disease. Dr. PAUL WOOD was chairman of a panel consisting of Dr. R. DALEY (London), Dr. P. H. DAVISON (Birmingham), Mr. G. H. WOOLER (Leeds), Mr. J. R. BELCHER (London), and Mr. A. LOGAN (Edinburgh).

The incidence of true restenosis of the mitral valve after a good valvotomy was 2%. It was too early to say whether better results obtainable with the transventricular dilator would reduce the incidence, but Mr. Logan had not operated for a second time on any patient on whom the dilator had

been used. Certainly restenosis, although uncommon, could occur after a good valvotomy: possibly active rheumatism might be a factor. The CHAIRMAN said that he had not been able to prevent restenosis by the use of heparin or other anticoagulants. The more often restenosis occurred, the quicker it did so: in one patient restenosis had developed 12 days after operation. Mr. BELCHER stressed the need for considering the possibility of restenosis in patients who had improved and then deteriorated after a good valvotomy. The second operation could produce better results than the first.

The surgeons all agreed that valvotomy under direct vision was unlikely to produce better results than those obtained by the transventricular dilator. This instrument was not difficult to use provided that scrupulous control was exercised: the incidence of severe mitral incompetence was less than 5% with the dilator.

Prophylactic Valvotomy

Opinion was divided upon whether the symptomless patient with mitral stenosis should have a valvotomy. Dr. DALEY thought that the operation should be done because of the risk of heart failure, but Dr. DAVISON and the CHAIRMAN felt that systemic embolism was a greater risk. The feeling of the panel was somewhat against prophylactic valvotomy, but atrial fibrillation was important in predisposing to embolism. For the patient who had suffered a systemic embolism but was otherwise symptomless, Mr. WOOLER felt that immediate anticoagulant therapy followed by early valvotomy was necessary, but Dr. DALEY disagreed about valvotomy. Dr. DAVISON considered that evidence of significant obstruction to the mitral valve was a good indication in such a case. Mr. Belcher thought that the embolus usually came from the left atrial appendage, but pointed out that 75% of patients with previous embolism had no thrombus in the atrium or appendage at valvotomy. Late embolism after valvotomy was only of the order of 1%. Dr. WOOD thought that the only difference between patients with mild stenosis and atrial fibrillation, operated or unoperated, was the absence of the left atrial appendage in the former. In view of the much lower incidence of emboli after operation this suggested that the left atrial appendage was often the source of the embolus. This view was challenged by Mr. Logan, who said that he had not removed an atrial appendage at valvotomy for the last eight years and had noted no increase in the incidence of emboli following operation.

Mr. WOOLER mentioned 17 patients in whom he had attempted open repair of an incompetent mitral valve. Removal of calcium and mobilization of the aortic cusp were important. Eight patients had died, but in the survivors the clinical and haemodynamic evidence of mitral incompetence was strikingly diminished. Mr. BELCHER stressed the importance of early repair when serious incompetence had been produced by valvotomy.

Left Heart Catheterization

In conclusion the panel discussed the indications for, and methods of, performing left heart catheterization in mitral disease. Dr. DAVISON considered that the prime indication was to decide on the relative importance of stenosis and incompetence, and advocated left ventricular angiography via a peripheral artery. In mitral incompetence a jet of contrast medium could be seen passing from the left ventricle into the left atrium. Dr. DALEY commented upon the bronchoscopic method of puncturing the left atrium and stressed the importance of a gradient across the mitral valve in indicating significant stenosis.

Dr. WOOD deprecated the practice of recording gradients unless flow was measured also. He stressed that left heart catheterization was usually not required and that all techniques carried some risk.

One of the final conclusions was that valvotomy was not curative and that patients should be kept under constant medical supervision.

Cardiomyopathy

Dr. JOHN GOODWIN (London) began his paper on the subject of cardiomyopathy by stressing the lack of knowledge of primary disorders of heart muscle, and by stating his own definition of cardiomyopathy as "a subacute or chronic disorder of heart muscle of unknown or obscure aetiology, often with associated endocardial or pericardial involvement, but not atherosclerotic in origin." He divided cases into those occurring as part of a generalized disease (such as scleroderma); those associated with a generalized disease (such as carcinomatosis); and those whose aetiology was unknown but whose pathology was characteristic (such as endomyocardial fibrosis).

Dr. Goodwin then described work done in conjunction with Drs. Hollman, Gordon, and Bishop, of Hammersmith Hospital, and with Dr. Teare, of St. George's Hospital. Patients presented clinically in one of three ways: with evidence of cardiac obstruction; with cardiac constriction; or with heart failure and atrio-ventricular valve incompetence. The first group was usually due to asymmetrical hypertrophy of the ventricular septum. Any part of the inflow or outflow tract could be involved, but the left ventricular outflow was probably the commonest site. The disorder simulated aortic stenosis, but had important differences in that the pulse was normal or jerky, and the aortic valve uncalcified in older subjects. A pressure gradient could occur in the right in addition to the left ventricle; such gradients might increase with time.

Clinical presentation suggesting constriction was likely to be due to pericardial or endocardial involvement, but might be caused by a rigid myocardium. Examples of amyloid disease, leukaemia, polyarthritis nodosa, and eosinophilic cardiomyopathy were quoted. Clinical presentation with heart failure and mitral incompetence was more common and occurred when the myocardium was flabby, but signs of constriction might develop later.

In discussion Dr. WOOD paid tribute to Sir Russell Brock's first haemodynamic description of functional aortic stenosis, and said that constrictive cardiomyopathy might be distinguished from constrictive pericarditis by haemodynamic means, notably the presence of a systolic pulmonary artery pressure above 40 mm. Hg in cardiomyopathy, but below that figure in constrictive pericarditis.

SECTION OF CLINICAL PATHOLOGY

Friday, June 24

Sterilization in Hospital and General Practice

A symposium on sterilization in hospital and general practice was held on Friday, June 24. Introducing the symposium from the chair, Air Vice-Marshal T. C. ST. C. MORTON (Penryn) said that in his opinion bed curtains were a potent source of cross-infections in wards, and that a particularly local problem which he encountered in Cornwall was cross-infection with *Proteus* in elderly patients who had undergone prostatectomy. The widespread use of antibiotics made the control of staphylococcal infections much more difficult.

Autoclave Sterilization

Professor J. W. HOWIE (Glasgow) gave a paper on autoclave sterilization. He opened by distinguishing between the Listerian theory of antisepsis and the later aseptic ideal. General sterility was important if asepsis was to be achieved. It was a simple matter to kill vegetative organisms by heat. Organisms would be killed if exposed to high dry temperatures, and the addition of moisture permitted the use of lower temperatures. This was the basis of autoclaving. Whereas the sterilization of bacteriological media was a comparatively simple matter in the laboratory, an ordinary laboratory autoclave was unsuitable for the sterilization of surgical instruments and dressings. The surgical autoclave was a more complicated piece of apparatus. Materials would not be sterilized unless air was continuously discharged from the apparatus during the process, even if a vacuum had been

drawn first. Downward-displacement autoclaves would work satisfactorily provided they were skilfully operated. Preliminary exhaustion of air was only satisfactory provided a high-vacuum pump was used, so that the steam would penetrate instantly. The residual air, of which there was only a small amount, would also be immediately displaced in a high-vacuum autoclave. Higher steam pressures and temperatures allowed a more rapid cycle of operations, thereby increasing the amount of work which any single autoclave of this type could do. In downward-displacement autoclaves there must be a means of drawing air and condensate out of the instrument during autoclaving. Packing and dressings should be light in order to permit free penetration of the steam, and gloves should be sterilized at the same pressure and temperature as the dressings.

There were a number of faults in autoclave design, some of which were expensive to put right, but there were five common ones which could be corrected by any hospital works department for comparatively small sums. These were (1) lack of an automatic air and condensate discharge system; (2) lack of a thermometer; (3) excessive pressure in the jacket, leading to super-heating; (4) absence of a drain filter; and (5) easy contamination of the plumbing of the instrument. Autoclaves should not be operated by porters, probationer nurses, or medical students. Their operation was a task for engineers or pharmacists, and there was a strong case for a central autoclave service. Bacteriological testing of autoclaves was important, and the positioning of the test material in the instrument, if badly carried out, could lead to erroneous results. It was essential that the person testing the instruments should understand the process of autoclave sterilization.

Packaging

Mr. V. G. ALDER (Bristol) discussed the packaging, transport, and storage of surgical dressings. The maintenance of sterility in dressings was important; containers were easily damaged and wrappings became easily contaminated or permeated with micro-organisms. He had found the most effective wrapping material to be thick crêpe paper, preferably double, in which materials could be preserved sterile for long periods, provided the pack was protected from tearing. It was necessary to store the packs in suitable containers, and after experiment it was found that paper-lined cardboard boxes were the cheapest and most satisfactory ones available, though metal boxes with a gasket seal had been found to be very efficient. It was essential if paper-lined cardboard boxes were to be used that the steam should be dry. Provided these conditions were fulfilled, dressings stored in paper-lined cardboard boxes remained sterile for as long as 65 days. They were porous to steam, and therefore easily sterilized. The lid of the carton was sealed when it was delivered to the ward and it was tightly packed in order to avoid lumina in the contents. Box packaging was also suitable for the transport of dressing packets to other hospitals, and under such conditions the dressings had been shown to remain sterile for up to three months. For greater protection in these circumstances the boxes should be stored in strong paper or polythene bags, and it was found that, when cartons were deliberately contaminated with non-sporing organisms before being put in the bags, these organisms disappeared. Boxes of dressing packs were delivered to the wards in his hospital on trolleys, and it was essential that the trolleys should be loaded from the side rather than from on top in order to avoid damage to the boxes.

Packs should be stored in well-ventilated cupboards away from the wards, and preferably in a central sterile supply department. Such a department in a 450-bedded hospital required only 100 ft. (30 m.) of bench, and one packer could be trained to put up a pack in less than a minute. The department in his hospital was supervised by a nursing sister. He urged that this simple system of dressing supply could and should be set up in every hospital immediately. It guaranteed a sterile supply of surgical dressings which would remain sterile for a long time.

Syringes for General Practitioners

Dr. E. M. DARMADY (Portsmouth) discussed the sterilization of syringes and instruments for general practitioners. He had been surprised by the number and different types of syringe used by general practitioners in his area. Everyone was alive to the danger of contamination of multiple-dose syringes with the virus of infective hepatitis, and he reminded the meeting that the mortality from this disease was 10%. The multiple-dose syringe was very dangerous. In a recent investigation he had found that 17% of syringes sterilized by alcohol were contaminated. It was possible to obtain efficient sterilization by dry heat or by steam. The advantage of dry heat was that the syringe could be placed in a metal container ready assembled and the container could be sealed before sterilization. Syringes could be dry-sterilized in a laboratory oven, but thermo-coupled experiments which he had carried out showed that there was a wide variation of temperature in hot-air ovens. This especially applied to gas-heated ovens, and could be corrected only by the installation of a fan in the oven. Such ovens were not really practical propositions for general practitioners' use.

He had made tests on a continuous solid-fuel-burning domestic oven in his own home which was normally used for cooking, and had shown that this effectively sterilized syringes provided that not too many were put in it at any one loading. In this connexion Brown's tubes were helpful in ensuring that an adequate temperature had been reached. At the same time the use of these ovens did to some extent disorganize the domestic arrangements of the household, and a satisfactory alternative method was provided by the use of an electric hotplate with a lid which could be thermostatically controlled, and on which sterility was obtained in 25 minutes. This last piece of apparatus could be adapted to steam sterilization by putting a small tray on top of the hotplate, but it was thereby made rather bulky. Now there were small autoclaves available which generated their own steam and produced rapid sterilization.

For transport, paper bags could be used to carry the syringes and instruments, and if these were put in a non-sterile polythene bag they would remain sterile themselves for much longer than if carried alone. Prepackaged instruments could be sterilized by gamma irradiation, especially catheters, but this was uneconomic for syringes, though needles supplied in this way were reasonably cheap.

Chemical Disinfection

Dr. R. A. SHOOTER (London) gave an account of chemical disinfection. The principal use of chemical disinfection was to disinfect articles which, for one reason or another, were impossible to sterilize by heat. The choice of disinfectant must be made on rational grounds after considering all the various factors which would be involved, such as susceptibility of the organisms, the speed at which it was desired to kill them, the presence of organic material on the article to be sterilized, the toxicity of the disinfectant, and the bactericidal–bacteriostatic concentration ratio. There was a big gap between a bactericidal concentration of a disinfectant and a concentration which would inhibit the growth of micro-organisms. In testing chemical disinfectants it was very important to ensure that there was no trace of the substance left in the tube. Some chemical disinfectants could be diluted out, but for many it was necessary to incorporate in the culture system some neutralizing substance.

Reviewing various commonly used chemicals, he pointed out that hydrogen peroxide worked well in water, was rapid in its action, and was neutralized by organic material and ineffective against spores. Halogens were effective against spores but partly neutralized by organic material. Quaternary ammonium compounds worked rapidly in water but were

seriously impaired by the presence of organic matter and were ineffective against spores. They could be toxic and had the disadvantage that they made micro-organisms adhere to the walls of test-tubes. Phenol and lysol were not impaired by the presence of organic matter but were ineffective against spores and were toxic. Halogenated xylenols were neutralized by organic matter and were not effective against spores. 70% ethyl alcohol was the only effective concentration of this substance and was a most useful disinfectant, but it was ineffective against spores and in the presence of blood and pus. Formaldehyde was effective against spores but penetrated only poorly and was toxic. Proflavine was slow in action and ineffective against spores, but was not impaired by the presence of organic matter and was not toxic.

Turning to the disinfection of different articles, he recommended for bed-pans the use of a washer sterilizer. Infective stools should be covered with lysol for one hour. Urinals should be disinfected in washer sterilizers or in 0.1% hypochlorite. The provision of individual urinals to each patient was essential. Rubber catheters could be boiled. Silk-web catheters could be sterilized in formaldehyde, mercuric chloride solution, or ethylene oxide gas. Some cystoscopes could be boiled, and when it was not possible to boil them pasteurization at 75° C. was reasonably effective. A useful disinfectant solution for cystoscopes was 0.02% chlorhexidine plus 0.05% mercuric oxycyanide in alcohol. Crockery should be boiled or washed up in dishwashers. Individual thermometers should be supplied to each patient and should be disinfected in 1% iodine in ethanol. Baths could be disinfected with crude hypochlorite solution containing a suitable detergent and washed out with a few gallons of hot water, or hexachlorophane could be added to the bath water, which had the advantage of disinfecting the patient as well as the bath. Babies' napkins should be boiled after rinsing in a washing machine. Sputum pots should preferably be disposable, but if not they should be soaked in 2% lysol for one hour. Floors should be disinfected with phenol or lysol. Lysol or "sudol" was also suitable for furniture, which could also be disinfected with formaldehyde vapour. Hypochlorite solutions were useful where staphylococcus was the target of the attack. Skin disinfection could best be effected by the use of 1% iodine in 70% ethanol, or perhaps better by the regular use of hexachlorophane soap.

Central Supply Service

In the discussion which followed and in reply to questions by Dr. G. STEWART SMITH (Exeter), Mr. ALDER said that the packaging and transport systems of sterile dressings which he had described were now past the experimental stage and in use in his own hospital, and could safely be adopted elsewhere. Professor SCOTT THOMSON (Cardiff) suggested that it would be better to establish a central sterile syringe supply service for all practitioners throughout the country rather than to encourage them to purchase some form of sterilizing apparatus for their syringes. Air Vice-Marshal MORTON gave his opinion that disposable syringes were very expensive; Professor HOWIE and Dr. DARMADY said that a central syringe supply service for practitioners was very economical and was actually in operation in a number of areas throughout the country.

Dr. H. J. PARISH (Beckenham) referred to the risk of syringe-transmitted hepatitis, the incubation period of which was 8–24 weeks. Therefore it was possible that cases of infection were occurring long after the injection which had caused them had been forgotten. It was likely that the number of cases caused by injection was much higher than that of recorded cases, and this alone provided an extremely strong case for a central syringe service. The L.C.C. had found it possible to operate such a service economically, and their most expensive item was transport. Plastic disposable syringes were relatively cheap, but the provision of sterile containers was an expensive item. There might still be some danger from drawing materials for injection from multiple-dose containers even though a fresh sterile needle was used for each case.

Dr. W. A. GILLESPIE (Bristol) felt that, though boiling did not kill bacterial spores, nevertheless it was effective against the virus of hepatitis and he thought it should have a place. Professor HOWIE said that boiling was only rarely effectively carried out. Dr. S. G. BROOK (Barnstaple) described his experience in an inoculation clinic where boiling sterilization was carried out, and said that, provided there was a large enough pool of syringes to draw on, the method was satisfactory. He could not say how long his syringes had been held at 100° C., but thought it was about 15–20 minutes. Professor SCOTT THOMSON thought there was some danger of contamination of instruments and dressing packs from central sterile supply departments during storage on wards. In reply to Dr. Parish's remarks Dr. DARMADY agreed that the problem with sterile disposable syringes was one of providing a cheap disposable package. This could be overcome, but at present packages available were rather expensive. He too emphasized the vital importance of using one syringe per person. He thought that disposable needles would soon be available on a large scale, and possibly also disposable syringes.

Dr. G. STEWART SMITH raised the question of the possibility of lysol burns, and Dr. SHOOTER said he thought that the concentrations he had recommended were such as to carry very little risk if the materials were used intelligently. The strength of the lysol solution which he advocated for stool disinfection was adequate, but the stool needed to be stirred up in it.

Washing of Bed-pans

Dr. R. B. H. TIERNEY (Barnstaple) said that in his hospital bed-pans were washed and then boiled. Dr. SHOOTER said that the shape of the bed-pan had a considerable bearing on the ease with which it could be cleaned, and Dr. DARMADY thought that the combined washing-sterilizing machines for bed-pans were often inefficient because there was insufficient water pressure to get rid of all the faeces. A simple domestic washing machine was an excellent apparatus for cleaning bed-pans and would also permit their exposure to a water temperature of 184° F. Professor HOWIE said it was unnecessary to get rid of spore-bearing organisms from bed-pans, but coliform organisms would not be killed unless the pan had been thoroughly boiled. It was in the washing procedure that bed-pan washer-sterilizers failed.

Summing up the discussion Professor C. A. WELLS (Liverpool), said there was a need for explanation in simple terms of the mode of action of various sterilizing techniques, and it should be realized that various problems of sterilization and disinfection differed considerably from one another. The problem of hospital sepsis had really only emerged comparatively recently. Infection and cross-infection were less in tropical and sub-tropical countries because patients came into hospital comparatively clean and after considerable exposure to sunlight. He thought patients should be cleaned when they came into hospital and that isolation should be obligatory during the cleansing process and before they were admitted to a general surgical ward. He had found pasteurization of cystoscopes effective, but thought that a large pool of cystoscopes should be provided to ensure that those undergoing pasteurization received treatment for a sufficient length of time. Antiseptic and disinfectant solutions should be renewed frequently, and the effective life of the solution should be indicated on the label on the bottle. He regarded urethral catheterization as an assault on the patient, and midstream specimens should always be collected from men and clean specimens from women. The bed-pan, he said, was gradually being eliminated from hospitals. In his opinion the presence of staphylococci in materials which had been autoclaved indicated recontamination after sterilization rather than failure of the sterilizing process. It was perfectly possible to institute a central sterile syringe supply service for all practitioners even where the population to be served was as many as 1,000,000 people.

SECTIONS OF GENERAL PRACTICE, GERIATRICS, AND NEUROLOGY AND NEUROSURGERY

Friday, June 24

Cerebral Vascular Accidents

The president of the Section of Geriatrics, Dr. MARJORY W. WARREN (London), took the chair at a combined meeting of these three Sections, at which cerebral vascular accidents were discussed. Dr. AGNES KENNIE (Paignton) had observed the incidence of cerebral vascular lesions in two West Country practices. Patients of 65 and over constituted 22% of their N.H.S. lists, and in a year three-quarters of them were seen. Cerebral vascular catastrophes accounted for 25% of the deaths per year in this age-group. She emphasized that accurate death certification was very difficult when the whole body was taking part in the ageing process. She was sure that many minor strokes were not reported. The altered gait, the stiff handshake, or the eccentricity resulting from strokes was reckoned a social stigma. She had found that old people feared death less than loneliness, disabilities, and dependence upon others.

Dr. JOHN MARSHALL (London), discussing medical treatments, said that assessment of the results of therapy was handicapped by the great uncertainty in diagnosis. Necropsy findings in strokes differed widely from the clinical diagnoses. In a series of angiograms on 80 unselected cases of stroke no abnormality was shown in 46, and 17 out of 33 positive radiological diagnoses differed from the clinical assessment. He thought anticoagulants helped in cases of cerebral embolism, but in a controlled trial of 51 cases of cerebral vascular insufficiency not due to embolism no benefit had resulted from their use. Similarly, in an as yet incomplete study of cases of cerebral haemorrhage treated with an antihypertensive regime, sequential analysis suggested no advantage was being gained, and the mortality had been 60%, often because of the complications.

Mr. RICHARD T. JOHNSON (Manchester) said that the surgeon alone could study living pathology: the extent of cerebral haemorrhages which were compatible with life was remarkable. He did not think that surgery had much to offer yet in the early treatment of strokes, because the haemorrhage could not be stopped. Many patients with a fatal haemorrhage lingered on for weeks, but others who survived the first few days showed a rise of intracranial pressure with compression of, or secondary haemorrhage into, the midbrain. It was the speed of the distortion of the midline anatomy which mattered most. Some of these patients could be saved by slow decompression and evacuation of clot. Localization could be helped by the E.E.G. or angiography, but there were hazards in the latter procedure. Lesions of the posterior fossa were particularly amenable to surgery.

Prognosis for Hemiplegics

Dr. GEORGE F. ADAMS (Belfast), who discussed prognosis, had followed up 710 hemiplegic patients referred three to four weeks after their strokes for rehabilitation. This was a selected series which naturally excluded the early deaths and the very rapid recoveries: his patients were the hard-hit residue: 81% survived the first two months; 39% had remained as long-stay hospital cases, and 42% had recovered enough to walk. Of the latter, rather less than half had regained full independence. The earlier rehabilitation began, the better the results. He had not found that a lesion of the dominant hemisphere resulted in a worse prognosis, but mental reactions and disturbances of the body image were commonest in lesions of the non-dominant side. His series suggested that the median expectation of life for those under 65 was 6 years; for women over 65 the expectation was 4 years, but for men over 65 it was only 3½ years. One-third of the deaths were due to a subsequent stroke, and one-third to respiratory infection.

Professor P. C. P. CLOAKE (Birmingham), president of the Section of Neurology and Neurosurgery, believed that multiple transient strokes resulted from small emboli from an atheromatous carotid artery, and in some cases a stenosed portion of the vessel could be replaced. Discussion centred round whether or not all patients with recent strokes but without loss of consciousness ought to be admitted to hospital. Dr. LINDSEY W. BATTEN (London) said that the need for accurate diagnosis must be set against the distress the move might cause the patient. Dr. ELUNED WOODFORD-WILLIAMS (Sunderland), reviewing the complexities of diagnosis, was sure that early admission was essential though the patient might be returned home soon afterwards. In reply to the complaints of Dr. A. FULLERTON (Dewsbury), Dr. R. M. J. HARPER (Barnstaple), and others, that the difficulty was to obtain a bed for such patients, Dr. WARREN said that in places where a proper geriatric service had been set up the problem was usually solved: personal contact between the practitioner and the hospital physician was vital. Dr. W. D. STEEL (Worcester) believed that local authorities, whose social services were so vital to victims of strokes, had no conception of the size of this problem, and his view was shared by Brigadier H. LL. GLYN HUGHES (London), president of the Section of General Practice. Dr. ADAMS, in reply to questions, said that out-patient physiotherapy was valuable if the case remained the personal responsibility of the physician who had provided treatment in the hospital wards, and if his physiotherapists understood the special needs of elderly people.

SECTION OF OTOLARYNGOLOGY

Friday, June 24

Nasal Obstruction

With the president, Mr. J. ANGELL JAMES (Bristol), in the chair, Mr. J. C. HOGG (London) discussed the causes and treatment of nasal obstruction. He stressed that in lower animals the function of the nose was primarily for olfactory purposes, but in man the respiratory functions, which include disposal of secretions, efficient functioning of the Eustachian tubes, and resonance chambers for the voice, had assumed greater importance. Newborn babies could not mouth-breathe; hence bilateral posterior choanal atresia was a neonatal emergency and must be relieved or the child was in grave danger of suffocating. Simple perforation of the obstruction via the anterior nares could be a life-saving procedure. In the adult unilateral or bilateral cases were best dealt with by splitting the soft palate at the attachment to the hard palate and fashioning mucosal flaps to prevent stenosis occurring. Adenoids were the commonest cause of nasal obstruction in children. While surgical treatment in Britain had varied little in the past fifty years, in America removal under direct vision by forcible retraction of the soft palate was increasingly practised. However, there was some risk of tearing the palate, nor could an adequate view of the roof of the nasopharynx be obtained without the use of a mirror.

The speaker then turned to the subject of nasal allergy, particularly the form in which hypertrophic fringes developed on the turbinals. This condition seemed to occur more frequently in young males who had a long history of nasal obstruction associated with poor general health and a neurotic disposition. He made a strong plea for discouraging the use of vasoconstrictor drugs in the nose, all of which to some degree produced rebound mucosal engorgement. Addiction might be so great that withdrawal symptoms would make the patient need sedation. In mild cases cotton-wool packs soaked with protazol solution still held a place in treatment. If the condition was more severe, shrinkage of the inferior turbinals by linear cautery or preferably submucosal diathermy gave good results. Occasionally hypertrophic fringes needed removal, but care had to be taken to avoid removing too much tissue. The middle turbinals could safely be removed without leading to crusting. Atrophic rhinitis might present as nasal obstruction, but it was a vanishing disease and probably due to dietary defi-

ciency in youth. The speaker had not found much value in the local application of oestrogens in oil, and advocated douching, local applications of glucose in glycerin, or, in the severe cases, narrowing of the nasal fossae by submucosal insertion of acrylic plastic strips. These might, however, be subsequently extruded.

Mechanical obstruction to the airway was commonly caused by deviation of the nasal septum, most often resulting from injury. Correction by submucous resection, an operation devised by Killian in 1904, was still the most widely used treatment, though recent modifications were increasingly employed. Operation before facial growth had ceased or in the elderly should be avoided.

Treatment of Infections and Tumours

Mr. T. McM. BOYLE (Leeds) read a paper on the surgical treatment of pyogenic infections and malignant tumours of the nose and sinuses. He strongly agreed with the previous speaker in condemning the over-use of nasal decongestants. He also pleaded for early treatment of pyogenic infection of the sinuses. The first step in surgical treatment was usually irrigation of the maxillary centres to remove pus. Often the results of one irrigation resulted in cure, and in these cases the pus was sterile and merely acting as an irritant. Recognition of the causal bacteria was helpful, as the appropriate antibiotic could then be instilled into the antrum. When two or three irrigations failed to clear the infection, antral drainage was the next step. Apart from endonasal antrostomy in children to avoid risk of damage to the unerupted permanent teeth, the Caldwell–Luc operation was the best standard procedure. Where other sinuses were also involved, the Caldwell–Luc approach allowed satisfactory ablation of the ethmoid labyrinth and was also the essential first step before dealing with the ethmoid or frontal sinuses. Of the three surgical routes to the ethmoid labyrinth the intranasal approach was not as good as the transantral route of Paterson's operation, both of which gave satisfactory results. For treatment of frontal sinusitis the osteoplastic-flap method of Macbeth had now largely outmoded other operations.

Malignant disease might be either a highly malignant form of carcinoma or a less malignant non-metastasizing but locally recurrent papillary carcinoma. The first type was best treated by a preliminary course of cobalt beam therapy. If there was evidence of orbital involvement, it would be necessary to risk irradiation damage to the eye. After an appropriate interval the upper jaw and possibly the orbital contents were removed by palatal fenestration unless the soft tissues of the cheek were involved, in which case the external approach was required. More conservative radiotherapy and surgery usually sufficed for papillary carcinoma.

Dr. M. G. THORNE (Torquay) discussed the use of adrenocortical steroids in the treatment of allergic rhinitis. This condition might be fired off by many stimuli, among which were allergens, non-specific irritants, infections, chemical irritants including alcohol, and psychological disturbances. Usually the affected individual reacted to several of these stimuli, and the problem was one of a hypersensitive and hyperreactive nasal mucosa rather than a provocative agent. The many forms of treatment that had been employed in the past reflected the commonness and intractability of the complaint. He did not recommend the use of locally applied vasoconstrictor drugs. Oral administration of antihistamine drugs was apt to cause a soporific effect if given in a dosage adequate to control the nasal symptoms. Though certain patients responded to these treatments, there was a hard core of resistant individuals, some of whom were severely incapacitated by nasal obstruction, suffering loss of sleep and respiratory disease. It was for these cases that oral corticosteroid therapy might be considered.

The speaker stressed the serious hazards of this treatment, and mentioned the alteration of the sodium and potassium balance, the susceptibility to infection with masking of clinical signs, the liability to peptic ulceration, the breakdown of tissue protein, and precipitation of diabetic or psychotic states. It was not suitable for the very young or the old, or for patients with peptic ulceration or cardiovascular disease. These dangers did not apply so much to short-term therapy. But many patients required long-term suppressive therapy, and in these the potential complications were serious enough to demand the most stringent selection of cases and the most careful control of dosage. As the dosage sufficient to ameliorate the patient's condition was also enough to disturb physiological balance, complete relief should not be aimed at but just enough to produce tolerable benefit.

Mr. S. W. ALLINSON (Boston, Lincs) affirmed that his tonsil-and-adenoid operation waiting-list had been abolished by teaching children to breathe properly through the nose from infancy. In many cases this treatment removed the need for operation.

Panel Discussion on Cough

Mr. J. ANGELL JAMES (Bristol) took the chair, and with Dr. R. L. MIDGLEY (Bovey Tracey), Mr. J. I. MUNRO BLACK (Newcastle upon Tyne), Mr. G. A. FRASER (Brighton), and Professor A. V. NEALE (Bristol) formed the panel. Professor Neale defined a cough as essentially a reflex mechanism in which, following a deep inspiration, a forced expiration is made against the momentarily closed glottis, the opening of which was associated with very high air velocities. The movements of the tracheo-bronchial tree occurring in a cough were passive, and no peristaltic-like movements occurred. The air velocity through the glottis momentarily reached a speed of 200 miles (320 km.) an hour and an air flow at the rate of over 500 litres a minute. Considerable muscular activity of the whole body is needed for the maximum expectorant effect.

Mr. MUNRO BLACK considered that a cough was an abnormal state of affairs which must have a reason. Normal auscultation and a normal radiograph of the chest were not proof of the absence of a lesion, which might be in the ears or nasal sinuses or even due to a dusty atmosphere. In children he often found that a productive cough was due to nasal sinusitis or wax keratosis of the ears. The latter could cause reflex vagal irritation and in a high proportion of cases seemed to be associated with nasal sinusitis and bronchitis or bronchiectasis.

Dr. MIDGLEY agreed that cough, like pain, was a symptom of abnormality. It was not uncommon to find a normal chest radiograph, and he advocated bronchoscopy, which might show tuberculous tracheo-bronchitis or an early carcinoma, and bronchial lavage to obtain material for bacteriological examination when the sputum was scanty.

Asked the difference between a cough and a sneeze, the panel agreed that both were functionally related to expel foreign matter or secretions, and that the centres in the medulla were close to one another. Attempts were made to define a "stomach" cough and a "barking" cough. The former was a lay term and implied a cause in the stomach. Apart from cases of thoracic stomach there was no substance in this belief, and the description applied to a cough associated with pronounced movement of the abdominal muscles. A barking cough was defined by one speaker as having its origin three inches lower than a hacking cough but above the stomach cough. It was thought to have a characteristic sound and be caused by mucosal drying from large adenoids or a psychosomatic disorder. It was agreed that coughing could be habitual, both in children and adults, though none of the panel had seen a case obtaining benefit from psychiatric treatment. Dr. Midgley, referring to cough in the aged, usually found it to be due to advanced disease which did not respond to antibiotics because the tissues had lost much of their ability to recover. Physiotherapy, including postural drainage, was of value in these cases.

Mr. MUNRO BLACK believed that what he termed respiratory suppuration, where there was resistant sinusitis and bronchitis or bronchiectiasis, was caused by severe infection

in infancy. He was seeing fewer cases now in children under the age of 8 years, and thought that adequate antibiotic therapy was largely responsible for the improvement. Another factor was the improvement in the standard of living. Laryngeal vertigo, in which the patient fainted after a coughing fit, was, like paroxysmal laryngeal spasm, largely an anxiety symptom, and occurred in patients working under strain.

SECTION OF PSYCHIATRY

Friday, June 24

"The New Tower of Babel"

Dr. E. B. STRAUSS (London) chose for the title of his presidential address "The New Tower of Babel." Criticizing diagnostic categories in current psychiatric terminology, he advocated labels which indicated the main nosological category of the disorder, the variety of the disorder, and the probable aetiology. This was possible only if a set of definitions could receive universal acceptance.

A terminology of this kind implied three basic principles —namely, multiple aetiology and, arising from this, the use of multiple diagnosis and multidimensional treatment. Dr. Strauss went on to give his own definitions of psychoneurosis, psychosis, psychopathy, and oligophrenia, and to criticize certain "mischievous diagnostic labels" such as "neurotic depression," "anxiety depression," "schizoaffective state," and "hystero-epilepsy."

The terms "endogenous" and "reactive" in relation to depression were misleading in circumstances which could properly be conveyed only in descriptive terms such as "depressive psychosis, partly reactive, partly pre-climacteric." He did not include anorexia nervosa in the main types of psychoneurosis because, in his experience, this condition often concealed a schizophrenic illness, though in other cases it was a form of conversion hysteria. His own definition was unambiguous: "a condition which occurs only in adolescent or young females of asthenic physique, who are virgines intactae."

Recognizing the unwieldy nature of his labels, Dr. Strauss felt these were preferable to "the short, neat ones so much beloved by physicians." He invited psychiatrists throughout the world to "vacate their quarters in that out-of-date skyscraper, the new Tower of Babel."

Entities Questioned

Dr. EMMANUEL MILLER (London) was prevented from attending the meeting, and his paper was read by Dr. GERALD SLOT (London).

Agreeing that entities should not be multiplied unnecessarily, Dr. Miller questioned whether in fact we were confronted by "entities." Should we, he asked, use the term "depression" both for those conditions endogenously weighted and for those reactively precipitated? Often depression concealed deeper mechanisms and acted as a defence against disintegration, and the same could be said of hysterical reactions. There was no evidence of correspondence with basic "structures," and the main emphasis was on the concept of process, which amalgamated the factors into a biopsychic continuum. At a time of rapid progress, arising from the dynamism of psychopathology and biochemistry, the emphasis was on marginal and frontier characteristics, and any definition must be readily discarded.

Problems in Terminology and Classification Presented by Recent Advances

Professor MARTIN ROTH (Newcastle upon Tyne) held that the purpose of definition was not only to facilitate communication but also to facilitate the systematic exploration of causes of disease. Ideally a classification should be exhaustive, its categories should exclude one another, and it should be based throughout on one principle. This was a difficult ideal for psychiatry, and the Kraepelinian system, with its faults and paradoxes, worked fairly well in practice.

Schizophrenia-like psychoses were seen in epilepsy, alcoholism, brain injury, and amphetamine addiction, and recent studies refuted the suggestion that such phenomena were due to chance association of two distinct processes. Hysteria and depersonalization provided further examples. Even in some functional syndromes we might be dealing with "preformed cerebral responses."

Common Sense and Science in Psychiatry

Dr. W. A. C. RUSSELL-BARTON (St. Albans) contrasted the isolation of common-sense thinking with scientific thinking, which took nothing for granted and accepted only temporary isolation of one problem from another. The three stages in the development of science were ideographic (common sense), systematic, and nomothetic, in which rules were known and predictions could be made.

The need for definitions arose from the confusion of facts with symbols which denoted them. Dr. Russell-Barton considered various forms of definition and the purpose of words as a means of communication. Psychology and psychiatry provided special difficulties, as in the dependence on the honesty, vocabulary, and memory of the subject rather than on direct observation, as in physical examination.

At present a compromise between common sense and science was required in practice.

Symposium on Community Care of Mentally Sick

With the president, Dr. E. B. STRAUSS, in the chair, the symposium was opened by Professor W. M. MILLER (Aberdeen), who described the organization of community mental health services in the north-east of Scotland. He stressed the new awareness of the influence of social and domestic factors in determining the response of the sick person.

The north-east of Scotland had special advantages and constituted something of a "sociological laboratory" by virtue of stable homogeneous traditions and ease of communication.

Professor Miller described new developments, and said that experience pointed to the importance of human relationships, with emphasis on intimacy and ready adaptability, rather than the impersonal methods of production planning. From humble beginnings there should be creative development, directed to the formation of an institution and a tradition.

Comparison of Community and Hospital Care

Dr. PETER SAINSBURY (Chichester) spoke of the striking success of the Worthing experiment, as judged by a marked reduction in admissions from the relevant area since the beginning of the new service. The benefits or burdens to the families and the community remained to be demonstrated, and also those differential factors favouring admission or otherwise.

This was being attempted by a comparative study with the Old Manor, Salisbury, where more conservative methods prevailed. Systematic recording on an item sheet and detailed social schedules were being employed, and pilot studies were being undertaken to check the validity of the method.

There were pointers to the relevance of the size of household, age, diagnosis, social class, and financial status.

Community Care

Dr. E. C. HAMLYN (Plymouth) examined the problem of community care from the general practitioner's point of view. Local politics were to be reckoned with, especially since the local authority had increasing responsibility. Plans for a new mental health centre at Plymouth included opportunities for closer liaison with the family doctors.

Undergraduate psychiatric training was wholly inadequate, but new, if restricted, developments in the postgraduate field held promise. At Plymouth Dr. Robert Blair had followed the example of Dr. Balint of the Tavistock Clinic with gratifying results.

Psychotherapy, time-consuming initially, was time-saving in the long run for the general practitioner.

Dr. A. R. MAY (London) said that, in judging the success of the Worthing experiment, it had to be remembered that

the new admission rates were only on a par with the national average: and went on to consider methods at Mapperley and also at Bolton and Oldham within the framework of the general hospitals.

Dr. May had inquired why certain general practitioners sent psychiatric patients to a general hospital clinic far from their homes. This disclosed the patients' bias away from the mental hospital and the doctor's strong identification with the patient. The role of the general practitioner was most important in community care, which was a form of treatment in its own right and, as such, should be prescribed in a critical manner.

SECTION OF NEUROLOGY AND NEUROSURGERY

Friday, June 24

Difficulty in Walking

With the president, Professor PHILIP C. P. CLOAKE (Birmingham), in the chair, Mr. A. A. JEFFERSON (Sheffield) discussed "Difficulty in Walking—its Diagnosis and Treatment." He stressed that when spinal compression was of insidious onset there was a grave danger that the initial symptoms might become misdiagnosed as "arthritis" or "fibrositis." Emphasizing the good results which might almost uniformly be expected to result from removal of benign spinal tumours (meningiomata and neurofibromata), Mr. Jefferson said that meningiomata affected mainly the elderly female usually in the thoracic (sometimes cervical) region, whilst neurofibromata affected all age groups and all levels of the spinal canal. Some case histories were described to illustrate pitfalls in diagnosis; included in these were an example of intramedullary tumour and one of temporary, but very satisfactory, recovery resulting from surgery for spinal compression by malignant disease. Mr. Jefferson closed by describing several points which he believed to be helpful in diagnosis.

Intrathecal Injections for Pain and Spasticity

Dr. R. M. MAHER (Rochdale) read a paper on the relief of pain and spasticity by intraspinal phenol–silver-nitrate injections. He had introduced this technique in 1955 to relieve pain in cancer. The ordeal for the patient was no greater than that of lumbar puncture; the procedure could be carried out at the bedside, and it could be used for the treatment of bilateral pain, when cordotomy had grave disadvantages. The method had been gradually evolved and the current technique was to use phenol 1:20 in glycerine or, in more resistant cases, phenol 1:25 in glycerine combined with silver nitrate 1/100 gr. per ml. More than one injection might be required either because of the wide area involved or because of further spread of cancer. The highest percentage of good results occurred when the pain was of short duration. Dr. Maher showed that by combining intraspinal injections with immobilization considerable success could be achieved in controlling pain from secondary deposits in vertebral bodies or in the femoral neck. Injections could be made directly into the subarachnoid space or subdurally. He usually allowed five days between injections and at times treated as many as eighteen spinal roots. Recently he had been successfully treating facial pain caused by carcinoma with an aqueous solution of phenol (5%) injected near the foramen ovale. Finally, he stated that spasticity in the lower limbs caused by chronic neurological disease might be relieved by stronger intraspinal injections—e.g., 10% phenol in glycerine.

Neurological Manifestations of Malignant Disease

Dr. R. A. HENSON (London) opened a series of four papers devoted to neurological manifestations of general medical diseases with a contribution on "Neurological Disorders Associated with Malignant Disease." He now had experience of some 60 cases, of which 75% were suffering from bronchial carcinoma. He distinguished the following types: (1) a progressive subacute cerebellar disorder (such cases had gross loss of Purkinje cells); (2) pure sensory, or more rarely mixed motor and sensory, neuropathies; (3) encephalomyelitis (the symptoms in this group varied greatly according to the structures involved); (4) dermatomyositis and myasthenic myopathy, the clinical course here being subacute and liable to remission. The recognition of the underlying carcinoma in all cases might prove extremely difficult, and the mechanisms causing these syndromes had not yet been elucidated. Recently, Dr. Henson had observed widespread and rapid demyelination, accompanied by pathological changes in both oligodendroglia and in astrocytes as a terminal manifestation in Hodgkin's disease or leukaemia.

Neurological Manifestations of Haematological Diseases

Dr. N. S. ALCOCK (Exeter) described neurological disorders associated with various haematological diseases. He pointed out that vitamin B_{12} deficiency might not merely present with the picture of subacute combined degeneration of the cord, but with dementia or with bilateral involvement of the optic nerves. Diagnosis depended on the finding of a histamine-fast achlorhydria or low vitamin B_{12} levels in the blood. The speaker stressed the dangers of using folic acid, which might cause the blood picture to appear normal while the nervous system deteriorated. He next described a clinical picture, resembling that of cerebral tumour, caused by polycythaemia vera rubra. Dr. Alcock went on to recount a case with psychiatric disorders resulting from a toxic megaloblastic anaemia due to prolonged treatment with barbiturates. Treatment of such toxic megaloblastic anaemias provided the only real indication for folic acid. The speaker closed by mentioning that bizarre pains might result from deposits of multiple myeloma, while certain isolated cranial or peripheral nerve palsies might be associated with leukaemic deposits.

Neurological Manifestations of Alimentary Disorders

Dr. W. TREVOR COOKE (Birmingham) next described a series of 36 patients observed over a period of twenty years all of whom had neurological disorders associated with disorders of the alimentary tract. He stressed that in diarrhoea, and especially in steatorrhoea, one to two large stools might cause a potassium loss of 50–70 mEq. He described reversible extensor plantar responses and dementia occurring during phases of potassium depletion in a woman of 43 with regional enteritis. Thiamine deficiency was occasionally found in alimentary disorders, perhaps due to a change in intestinal bacterial flora. Several patients presented with subacute combined degeneration of the cord due to vitamin B_{12} deficiency appearing 1 to 15 years after gastrectomy. Entero-anastomoses might not infrequently lead to vitamin B_{12} deficiencies. Dr. Cooke mentioned a possible relationship between excess excretion of indole 3-acetic acid (which may occur in adult coeliac disease) and the development of amyotrophic lateral sclerosis. The speaker concluded with a brief description of the neurological consequences of severe liver disease.

Giant-cell Arteritis

Dr. H. LOVELL HOFFMAN (Bath) completed this series of papers with a contribution entitled "Cranial or Giant-cell Arteritis." The commonest symptom (found in nearly 100%) was headache. Those afflicted were rarely under 60 and often had a preceding period of malaise and rheumatic pains. The headache was severe and frequently related to the inflamed arteries. The affected cranial vessels were usually the superficial temporal and the occipital arteries. Visual failure occurred (often very suddenly) in roughly 50% of cases and might end in total bilateral blindness. The remaining important symptoms were diplopia (14%) and nerve deafness and vertigo. There was evidence that the vertebral and carotid arteries might be involved. Giant-cell arteritis sometimes affected the coronary or mesenteric arteries. A raised sedimentation rate was the most important diagnostic laboratory test (apart from biopsy—necessary only in difficult cases). Treatment should be by steroids—e.g., prednisone 5–10 mg. t.d.s. Treatment was urgent to prevent blindness, and anticoagulants might be used if steroids were contraindicated.

THE SCIENTIFIC EXHIBITION

[FROM A SPECIAL CORRESPONDENT]

The 1960 Scientific Exhibition, like other features of this year's Annual Meeting, was naturally on a smaller scale than in Edinburgh last year, but, like all other features of the Torquay Meeting, enjoyed a friendly and intimate atmosphere. Housed at the Upton Vale Baptist School Hall, it was honoured by a visit paid by the Duke of Edinburgh on Monday, June 20, and on the following afternoon the President, Sir Arthur Porritt, made an official tour of the exhibition.

Cancer

This year brought a special emphasis on malignant disease in its many aspects. Records and administration were dealt with by the South-Western Regional Cancer Records Bureau, Bristol. A map showed the incidence of cancer in different areas of the region, and graphs depicted the incidence of malignant growths in various sites of the body together with relevant survival rates. The Bladder Tumour Registry, Department of Surgery, Bristol Royal Infirmary, showed how much could be learned from a concentration of study and research on one particular organ. An analysis of 1,000 cases showed that prognosis depended on the extent of the growth when first diagnosed and on its histological grade.

A new approach to treatment was illustrated by the Royal Marsden Hospital and Institute of Cancer Research, the Royal Cancer Hospital, London. The use of regional perfusion with cytotoxic drugs through an artificial circulation was demonstrated on a lifelike working model. Of topical interest was the exhibit by the South-West Regional Transfusion Service and Department of Anatomy, Bristol University, of the technical details of a bone-marrow and foetal-haemopoietic-tissue bank. Finally, in the field of oncology, the Medical Research Council Carcinogenic Substances Research Group, University of Exeter, showed an apparatus for producing and analysing cigarette smoke. The machine, which smoked six cigarettes at a time, attracted the interest (? envious) of many visitors: but no one was seen to help themselves from the open cigarette carton used to feed the machine.

Medicine

In the sphere of general medicine the Diabetic Department, Royal Free Hospital, London, devoted a stand to the problems of diabetes in later life—prevention, recognition, and treatment. The Department of Experimental Medicine, Guy's Hospital, London, presented the results of studies of peripheral glucose metabolism in diabetes. These showed that the peripheral tissues have a glucose threshold which is raised in diabetes and lowered by insulin and oral antidiabetic agents. The Department of Medicine, United Bristol Hospitals, demonstrated in very clear fashion a method of measuring the critical closing pressure of the digital blood-vessels, used in vascular studies of hypertension. Portal hypertension was the subject at two displays. From the Royal Free Hospital, London, came a threefold demonstration board setting out the types, causes, clinical picture, and treatment; while portal pressure in health and disease in man and animals was depicted by the Department of Surgery, Bristol Royal Infirmary.

A comprehensive account of Reiter's disease was presented by the Empire Rheumatism Council, the Department of Venereal Diseases, Whitechapel Clinic, the Departments of Radiodiagnosis and of Physical Medicine and the Regional Rheumatism Centre, the London Hospital. The clinical, radiological, and pathological features and the differential diagnosis were clearly set out. The South-West Faculty of the College of General Practitioners recorded the distribution of farmer's lung in three different areas with differing climates and types of farm. The Diagnostic *X*-ray Department, United Bristol Hospitals, showed conventional films and cineradiography of the biliary tract.

Paediatrics

The first stand on entering the Exhibition, from the Department of Child Health, Bristol University, was devoted to respiratory emergencies in infants, transmitting information by a maximum of illustrations and a minimum of words. The Department of Child Health, Bristol Royal Hospital for Sick Children, urged the importance of routine spirography in assessing chest disorders in children; and the Department of Child Health, Sheffield University, showed how problems confronting handicapped children in their own homes could be overcome. Of topical interest was the presentation by the Endocrine Clinic, Department of Child Health, Bristol Royal Hospital for Sick Children, of a 12-years follow-up of 69 cases of bilateral cryptorchism: in 80% the testes were in the superficial inguinal pouches, and in 34% the testes were abnormal.

The Department of Paediatric Pathology, Department of Child Health, Welsh National School of Medicine, Llandough, displayed the natural history of spina bifida cystica as shown by 400 cases studied over a period of 10 years, in 62% of which there was hydrocephalus. Over 35% survived at least eight years, but they suffered serious disabilities. The Department of Child Health, the University and Children's Hospital, Sheffield, showed the results of a controlled investigation of the surgical treatment of hydrocephalus using the Spitz-Holter valve. Ventriculo-caval shunt reduced mortality, controlled growth of head, and improved the chances of normal mental development, but carried a 30% complication rate. Also in the field of neurosurgery was a very graphic account from the Department of Neurosurgery and the Burden Neuropathological Laboratory, Frenchay Hospital, Bristol, of the clinical and pathological features of the Sturge–Weber syndrome as shown by five cases treated by lobectomy.

Dermatology and Photography

This year dermatology, which especially lends itself to pictorial representation, came into its own. The Institute of Dermatology, St. John's Hospital for Diseases of the Skin, London, demonstrated with photographs and moulage the skin manifestations of tuberculosis and sarcoidosis. From St. Mary's Hospital, London, came an illustrated assessment of griseofulvin therapy in *Trichophyton rubrum* infection of the nails; and the Skin Department, Manor Hospital, Walsall, simply but neatly showed the relative value of various treatments for acne. The Bristol University Dental School showed clinical and histological photographs and described the hereditary pattern of four hereditary diseases of the mouth—amelogenesis imperfecta, dentinogenesis imperfecta, fibromatosis of the gums, and white-folded gingivostomatosis. Teeth were also to the fore in the exhibit by the Applied Biochemistry Department, Rowett Research Institute, Aberdeen, of research on the bones and teeth of sheep.

Two stalls showed what photography offered the general practitioner in his work. The Photographic Department, St. Mary's Hospital, London, demonstrated two simple techniques with standard 35-mm. equipment of colour photography of skins by the general practitioner. The medical groups of the Royal Photographic Society and the Institute of British Photographers, London, showed simple methods applicable to general practice—to supply evidence of changes in the patient's state, to record social conditions, and to illustrate research. And as an example of what can be and had been done, one general practitioner, Dr. Leslie A. Gibbons, showed "technamation," a scientific and optical method ideal for visual instruction. The animated blood circulations of adult and foetus, including cardiac abnormalities, were very impressive.

Surgery

In the sphere of clinical surgery the Department of Surgery, Bristol Royal Infirmary, illustrated arterial replacement. The place for each of the three types of graft—autogenous, homologous, and plastic—was clearly set out. In orthopaedics the Princess Elizabeth Orthopaedic Hospital,

Exeter, showed with simple but effective line drawings various techniques for surgery of the hip. The Surgical Unit, St. Thomas's Hospital, London, demonstrated the apparatus used for open heart surgery with perfusion and controlled hypothermia. Some of the problems of this work, including carotid reconstruction, were illustrated. The Institute of Ophthalmology, London University, warned in arresting style of the indications and contraindications for cortisone therapy in the red eye.

In the fields of urology and gynaecology, the Departments of Pathology, Urology, and Gynaecology, United Bristol Hospitals and Southmead Hospital, Bristol, indicated how the incidence of post-operative urinary infection had been reduced from over 80% to less than 10%. The Institute of Urology, St. Paul's Hospital, London, presented a review of male subfertility and distinguished which factors were amenable to surgical correction. The sole exhibit of obstetrical interest was from the National Maternity Hospital, Dublin. In the crisp lucid style we have come to expect from Dublin it graphically detailed the causes and management of collapse in the third stage of labour.

The Services

As usual the displays of the three Services were well patronized. The Royal Naval Medical School showed how tuberculosis, once regarded as an occupational disease of seamen, had declined because of advances in social as well as medical fields. The Army Medical Services demonstrated the organization and equipment of a central sterile supply service. The Air Ministry showed a modified Kolff disposable twin-coil artificial kidney. This impressive instrument was easily assembled and was equipped with electronic controls which monitored flow-rate, pressure, and temperature, and indicated visually and audibly any alterations in the circuit.

[Torquay Times and Devonshire Press, Ltd.

The Duke of Edinburgh at the Air Ministry stand.

Physical Medicine

Considerable interest was shown in the Hendon pneumatic prosthesis at the stall of the Committee for Research on Apparatus for the Disabled (National Fund for Poliomyelitis Research), London. This new type of pneumatic motor for application to flail-arm splints and artificial arms gives a greater power, range, and smoothness of control. The Paddington Group Hospitals Medical Rehabilitation Centre showed how out-patient medical rehabilitation could cut down disability time in medical, surgical, and orthopaedic conditions. The equipment for ultrasonic therapy in Ménière's disease was demonstrated by the Departments of Ear, Nose and Throat and Medical Physics, Bristol Royal Hospital. Finally, in a related field, the South-Western Regional Hospital Board exhibited equipment designed and developed by the Devon and Cornwall medical physics service.

In pharmacology the Research Department of I.C.I., Pharmaceutical Division, Macclesfield, showed in interesting fashion how the toxicity of a potential antibacterial drug had been tested in the laboratory. The Bristol University Department of Anaesthetics demonstrated the antagonistic effect of the barbiturates on the analgesia produced by opiates and nitrous oxide and illustrated a new method of measuring pain thresholds.

Other facets of research work were represented by a review of the work of the Research Defence Society of London, and by an exhibit from the Laboratory Animals Centre of the Medical Research Council, Carshalton, showing the planning required for working out specifications for laboratory animals. That artificially reared animals present their own problems was exemplified by the study of moniliasis in piglets reared for nutrition experiments by the Departments of Animal Husbandry and Veterinary Medicine, Bristol University.

Altogether the Scientific Exhibition continues to exert a strong drawing power, and to serve its purpose of presenting a compact and fairly comprehensive range of subjects of current medical interest in an easily assimilable form.

The Prizewinners

The PRESIDENT, Sir Arthur Porritt, when presenting the awards at the Scientific Exhibitors' Reception on June 23, said that the Scientific Exhibition was a first-class one and a credit to all who organized it and took part in it. He announced the judges' decisions as follows.

The Lawrence Abel Cup for the exhibit judged to be the most outstanding in the exhibition was awarded to Dr. Leslie A. Gibbons, a general practitioner in Reigate, for his demonstration of "technamation," a new method of showing the circulation of the blood in a visual and continuous form. The normal adult circulation and the foetal circulation with some cardiac abnormalities were displayed by this remarkable method.

The Certificate of Merit for the exhibit judged to be of the highest scientific value was awarded to the Research Department, Imperial Chemical Industries, Ltd., Pharmaceutical Division, Macclesfield (Dr. G. E. Paget, Mr. E. Thorpe, Dr. W. H. W. Inman, Miss E. M. Anderson, Miss C. M. Taylor), for their display showing "The Laboratory Evaluation of the Toxicity of a Potential Antibacterial Drug."

The Certificate of Merit for the exhibit judged to be of the highest teaching value was awarded to the display illustrating Reiter's disease, devised by the Empire Rheumatism Council, the Department of Venereal Diseases, Whitechapel Clinic, the Department of Radiodiagnosis and the Department of Physical Medicine and Regional Rheumatism Centre, the London Hospital (Dr. J. K. Oates, Dr. A. C. Young, Dr. R. M. Mason). The judges also made a second award in this category to the Institute of Ophthalmology, University of London (Mr. Barrie R. Jones, Dr. Peter Hansell), for their stand displaying the danger of cortisone therapy in various diseases presenting as a red eye and indicating those diseases in which it was of value.

TELEVISION AND FILM PROGRAMMES

As usual the closed-circuit colour television programmes were a popular feature of the meeting. With Mr. H. P. GUERRIER (Torquay), assistant science secretary, in charge of the arrangements, the staff of the Torbay Hospital and Exeter Clinical Area put on a well-mixed series of clinical demonstrations and operations. The production was in the hands of Smith Kline and French Laboratories, who also sponsored the programmes. The moderator, Dr. Lewis Couper (Exeter), was assisted by panels of experts on the subjects being demonstrated.

The programmes were as follows: Vaginal hysterectomy (Mr. JOHN MACPHERSON); the treatment of depression by E.C.T. under pentothal and scoline (Dr. H. SCOTT FORBES); lateral rachotomy—an approach to the vertebral bodies for

tuberculous disease, Pott's paraplegia, and the biopsy of vertebral tumours, etc. (Mr. NORMAN CAPENER); mitral valvulotomy (Mr. J. L. GRIFFITH); three ways of obtaining bronchial secretions for bacteriological and cytological examination from patients who are unable to produce sputum (Dr. R. L. MIDGLEY); prostatectomy (Mr. H. P. GUERRIER); complications of fractured neck of femur, arthroplasty by Moore's prosthesis as a means of salvage in selected cases (Mr. G. BLUNDELL JONES); simple out-patient treatment of rodent ulcers (Dr. R. D. SWEET and Dr. J. R. SIMPSON); cholecystectomy (Mr. P. J. W. MONKS); by-pass femoral arterial graft (Mr. A. M. N. GARDNER); methods and management of advanced breast cancer (Dr. R. C. M. HADDEN).

As can be seen from the above list most of the programmes were devoted to surgical subjects. One programme was, however, on an important paediatric theme —"The challenge of cerebral palsy, illustrated by the work of the Dame Hannah Rogers School for Spastic Children," and this has been chosen for special mention.

Challenge of Cerebral Palsy

This programme (chairman Dr. HUGH R. JOLLY) described the work of the school, which accommodates 50 boarders, all with intelligence quotients greater than 100. Some children had only mild physical defects, but others because of physical disabilities had difficulties and frustrations in manifesting intelligence. Dr. N. S. ALCOCK demonstrated the chief neurological features of the spastic and athetoid child.

Dr. F. S. W. BRIMBLECOMBE illustrated the clinical features by which an infant of 5 months could be recognized to be "spastic." He stressed particularly persistence of tonic neck reflexes, an abnormal posture when lying prone, with hips flexed, face buried in the mattress, and arms failing to support the upper trunk, also failure of the child quickly to bring its head erect when brought into the sitting posture.

Dr. JOLLY emphasized the importance of this demonstration, for, acting upon it, family doctors could recognize the spastic child early and arrange physiotherapy without delay. Modern techniques of physiotherapy were demonstrated by Mrs. PAT BEAMAN, who described the advances of the past 5 to 10 years. She explained the deficiencies of some corrective devices commonly employed. Mr. G. J. LILLIE mentioned that splints were now only employed during physiotherapy, while neurectomies and tendon transplants were largely discarded. With early diagnosis and prompt physiotherapy the need for surgery had lessened. The main work of the orthopaedic surgeon was now confined to treatment of the subluxated hip-joint. Included in the demonstration were the work of the speech therapist, and the method of selection of pupils (including full psychological assessment). Finally, Miss A. A. HILL stressed that this really was a school and the children sat (and passed) public examinations even though they might not be able to write.

Medical Films

The medical films from the B.M.A. Film Library shown during the Annual Meeting were the following: Edinburgh, 1959; Open Heart Surgery; A Talk About Insulin; Tendon-free Grafting (Certificate of Merit, B.M.A. Film Competition, 1959); The Doctor Defendant; Thrombose et Haemostase Spontanée; Miracles Take Longer; Treatment of Cardiac Arrest; Hospital Sepsis—a Communicable Disease; Atheroma—a New Therapeutic Approach; Jugular Venous Pressure; Bronchial Carcinoma (First Prize, B.M.A. Film Competition, 1959); Marlborough House (a film dealing with the care and training of mentally handicapped children and adults in a day training-centre) (Special Commendation, B.M.A. Film Competition, 1959); The Management of Twins in Pregnancy and Labour; Interference Microscopy of Normal and Cancer Cells in Tissue Culture; The Sully Concept of Primary Pulmonary Tuberculosis (Certificate of Merit, B.M.A. Film Competition, 1959).

Correspondence

Because of heavy pressure on our space, correspondents are asked to keep their letters short.

Sewage at the Seaside

SIR,—Much publicity is being given in the national press to the conflicting views of the medical profession on the question of sewage pollution at our seaside resorts. The position would appear to be in actual fact perfectly straightforward, as anyone who practises in or near the most polluted areas will confirm—namely, that bathing in polluted water carries with it a very definite risk of throat, ear, and eye infections, not to mention the risk of contracting the more serious infections.

However, let us disregard the evidence we see in our surgeries every summer and ask ourselves this question: Is it logical to preach the necessity of washing hands after defaecation and protecting food from contamination from flies if one is going to encourage the general public to take a faecal bath whenever weather conditions permit? It is said that the country could not afford to correct this pollution, but we all know that preventive medicine is in the end cheaper than the treatment of the actual disease.—I am, etc.,

Faversham, Kent. J. CANTOR.

Acute Rheumatism and Paediatric Beds

SIR,—It was most interesting to see from the letter from Dr. Victoria Smallpeice and Dr. Hugh Ellis (June 25, p. 1952) that they have observed in Oxford an increased number of admissions of children with acute rheumatism. We have noticed this increase, too, in London. While there is no notification of acute rheumatism, there are certain indicators that tell us, albeit crudely, what is happening. For example, during the first six months of 1960 there were 56 applications for hospital teaching for children with acute rheumatism, while in none of the same periods of the four previous years had there been more than 20 such applications.

This is in such marked contrast to our experience in the past ten years, when it looked as though it would be a race between non-pulmonary tuberculosis and rheumatic carditis to see which would first disappear, that it must seem that the epidemicity of the streptococcal infections may once more be changing, and we may have to face a return of the conditions of fifty years ago, modified by modern methods of treatment. What is disturbing, too, is whether some of us, in our zeal for the "normalization" of handicapped children, may not forget that the teaching of thirty years ago was based on sound observation, and that some of these children do need special care and special forms of education for a long time—the problem is to select the ones that need this, while not mollycoddling the others who have suffered no hurt from a brief illness.—I am, etc.,

Public Health Department,
London County Council,
London, S.E.1. DENIS PIRRIE.

Elimination of Tuberculosis

SIR,—I should like to thank Lieutenant-Colonel J. Mackay-Dick (June 25, p. 1953) for drawing attention to the dangers of labelling a patient a "quiescent" case of pulmonary tuberculosis. The use of chemotherapy must be constantly borne in mind for selected individuals

in this group. Lieutenant-Colonel Mackay-Dick asserts that cases of tuberculosis of the lung variously designated as "quiescent" or "inactive" or "dormant," and considered to have remained unchanged over a period of five years, cease automatically to be followed up. To support this contention he instances the Liverpool M.M.R. campaign of February and March, 1959, where a number of cases discovered showed signs of renewed activity after they had been removed from the register. It would be pertinent to know in which years these cases were removed.

In the words of Lord Byron "the best of prophets of the future is the past," and in recent years it has become widely accepted that there can be no arbitrarily fixed period for following up these patients. The length of follow-up depends not only on the amount and type of residual disease, but on varying factors, often unpredictable, such as poor housing, malnutrition, physical and mental overstrain, type of employment, and intercurrent illnesses. This means, therefore, that a substantial number of patients must be followed up indefinitely.

It is difficult to see how, as Lieutenant-Colonel Mackay-Dick suggests, an authoritative body can give a pronouncement as to when and how long chemotherapy should be carried out in "quiescent" cases. The Tuberculosis Society of Scotland[1] has carried out a control trial on 189 out-patients with lung lesions of doubtful activity. They were divided into two groups, and over a two-year follow-up period 17% of the untreated cases deteriorated compared with 8% of the treated group. The significant fact is that all the definite breakdowns in the treated group occurred in patients who had failed to take their chemotherapy.

Spot urine tests by various workers[2–5] have demonstrated that one can expect about two in every five out-patients to fail at some time to take their P.A.S. as prescribed. Inadequate dosage may produce drug-resistance, and Crofton[6] has pointed out that the development of drug-resistance can be a tragedy not only for the patient but for those others that the patient may infect. He instanced a survey in various clinics in this country in which no less than 5% of newly diagnosed patients were found to be infected with organisms resistant to at least one of the three main drugs.

An aspect that must not be overlooked, although it should not influence the physician unduly, is the possible effect on some asymptomatic patients of being told that they must submit to long-term chemotherapy. Day[7] wrote that the psychoneurotic, when given a touch of tuberculosis, will exploit his disease process to suit his pattern of living. Regrettably it does not appear feasible to prescribe our present chemotherapy arbitrarily to all patients with lung lesions of doubtful activity.—I am, etc.,

Church Crookham, Hants. D. J. AP SIMON.

REFERENCES

1 Tuberculosis Society of Scotland, *Tubercle (Lond.)*, 1958, **39**, 129.
2 Simpson, J. McD., ibid., 1956, **37**, 333.
3 Dixon, W. M., Stradling, P., and Wootton, I. D. P., *Lancet*, 1957, **2**, 871.
4 Wynn-Williams, N., and Arris, M., *Tubercle (Lond.)*, 1958, **39**, 138.
5 Luntz, G. R. W. N., and Austin, R., *Brit. med. J.*, 1960, **1**, 1679.
6 Crofton, J., ibid., 1959, **1**, 1610.
7 Day, G., *Lancet*, 1946, **2**, 703.

Hormone Treatment of Breast Metastases

SIR,—There was a leading article in your issue of July 2 (p. 41) on the hormone treatment of patients with metastatic carcinoma of the breast which dealt with the report of a Therapeutic Trials Committee of the American Medical Association. One of the matters discussed was the long clinically silent period between the first recognition of the tumour and the appearance of metastases which occurs in some patients when a natural menopause has interposed. The report you quote described this observation as "unique and hitherto unrecognized." Your leading article said that this was a mistake, but only quoted E. F. Scowen's Langdon-Brown lecture of 1955 and the work of G. J. Hadfield and J. A. G. Holt in 1959 as evidence. The mistake, however, is far greater than this would imply, since this subject has in fact been repeatedly discussed for many years.

There have, for example, been ten accounts that I know about of patients in whom spontaneous regression of breast carcinoma occurred at the time of the natural menopause. The first of these was reported as long ago as 1872 by Habershon,[1] another by Gould in 1897[2] and 1899,[3] one by Beatson[4] in 1901 and so on. The effect of the menopause in altering the pattern of treatment results was discussed by Evans and Leucutia in 1939[5] and by Richards in 1948.[6] The decrease in the frequency of bone metastases occurring at the time of the menopause was reported by Farrow and Woodard in 1942.[7] I wrote a paper on this subject in 1952[8] reporting the longest hormone-induced remissions of carcinoma of the breast yet recorded and quoted work done by the Danish Cancer Registry[9]; further reference was made to the menopause effect in a review of cancer of the breast by Smithers, Rigby-Jones, Galton, and Payne.[10] This matter was discussed by Denoix, myself, and others at the International Symposium on Mammary Cancer held in Perugia in 1957.[11] Work by Paterson and Russell[12] on the effect of induction of the menopause at an early stage in treatment also bears on this subject. References to the influence of the menopause on the natural history of carcinoma of the breast occur again in a recent book of mine.[13]

Your leading article rightly stresses the fact that the report of the Therapeutic Trials Committee provides a valuable statistical study of the profound influence which the menopause can have on the natural history of some patients with carcinoma of the breast. It is, however, wrong to suggest that this matter, which has exercised the minds of many people over many years, is a hitherto unrecognized or even a recently discovered phenomenon.—I am, etc.,

Radiotherapy Department,
The Royal Marsden Hospital,
London, S.W.3. D. W. SMITHERS.

REFERENCES

1 Habershon, S. O., *Guy's Hosp. Rep.*, 1872, **17**, 423.
2 Gould, A. P., *Trans. clin. Soc. Lond.*, 1897, **30**, 205.
3 —— ibid., 1899, **32**, 272.
4 Beatson, G. T., *Brit. med. J.*, 1901, **2**, 1145.
5 Evans, W. A., and Leucutia, T., *Amer. J. Roentgenol.*, 1939, **42**, 866.
6 Richards, G. E., *Brit. J. Radiol.*, 1948, **21**, 109.
7 Farrow, J. H., and Woodard, H. Q., *J. Amer. med. Ass.*, 1942, **118**, 339.
8 Smithers, D. W., *J. Fac. Radiol.*, 1952, **4**, 89.
9 Clemmesen, J., *J. nat. Cancer Inst.*, 1951, **12**, 1.
10 Smithers, D. W., Rigby-Jones, P., Galton, D. A. G., and Payne, P. M., *Brit. J. Radiol.*, 1952, Suppl. No. 4, p. 35.
11 *Proceedings of the II International Symposium on Mammary Cancer*, 1958. Division of Cancer Research, Perugia.
12 Paterson, R., and Russell, M. H., *J. Fac. Radiol. (Lond.)*, 1959, **10**, 130.
13 Smithers, D. W., *A Clinical Prospect of the Cancer Problem*, 1960, p. 53. E. and S. Livingstone, Edinburgh.

Tumour Chemotherapy

SIR,—I read with interest the leading article "Treatment of Trophoblastic Tumours" (June 4, p. 1718). The substance of the article is excellent, but I wish to comment on one incidental statement which may be inaccurate. The article states: "It is possible that choriocarcinoma will prove to be the first of the

malignant tumours to have been eradicated by chemotherapeutic agents." The work of Bodian and White[1 2] has proved that some cases of neuroblastoma, particularly those occurring within the first year of life, can be cured and the malignant tumour permanently eradicated by the use of large doses of vitamin B_{12}. This work, I think, should be regarded as the first published account with good evidence for eradication of malignant disease in a series of cases by a chemotherapeutic agent.

At this clinic we have seen, within the past two years, two infants under 1 year of age with a clear pathological diagnosis of neuroblastoma and each with clinically obvious metastases. One baby was in a very advanced stage of the disease and died within one month of the start of therapy with vitamin B_{12}. The second case was a half-breed Indian infant aged 5 months in September, 1958, when a diagnosis of neuroblastoma was made by biopsies of several metastatic subcutaneous nodules. No primary site was found, and injections of vitamin B_{12} were started, 1,000 microgrammes by intramuscular injection on alternate days. One month later the baby remained well but a new nodule had appeared as well as those already present. At this time short courses of aminopterin and of amethopterin were given without observable effect on the metastases. These drugs were therefore discontinued and vitamin B_{12} continued. Six weeks later the nodules were reduced in size and they gradually disappeared over the next few months. The child was last seen in March, 1960, and was well, without any clinical signs of disease.

It is known that neuroblastomas very occasionally undergo spontaneous retrogression, as do trophoblastic tumours, and one case is therefore of limited interest. However, it is not possible to account for all Bodian's cases on the hypothesis of spontaneous retrogression.—I am, etc.,

A. F. PHILLIPS.

Cancer Clinic,
Department of Public Health,
Province of Alberta, Canada.

REFERENCES

[1] Bodian, M., and White, L. L. R., in *British Empire Cancer Campaign Annual Reports, 1953, 1954, 1955, 1956, 1957*. London.

[2] Bodian, M., *Pediat. Clin. N. Amer.*, 1959, **6**, 449.

Vesicles at Injection Sites

SIR,—With reference to Dr. W. G. Benson's letter (July 2, p. 70), I have had two similar cases, and like Dr. Benson I have found no reference to this phenomenon in the textbooks.

In the first case, a boy developed a series of vesicles around the site of an injection of diphtheria booster given eight days previously. A diagnosis escaped me on the first day, but by the second day the boy obviously had chicken-pox, although it was very mild. The vesicles on the affected arm numbered 120, but on the other arm they numbered only five, and on the rest of the body put together he produced 35 vesicles.

In the second case, a boy developed chicken-pox seven days after a combined T.A.B. and cholera injection. In his case he had 115 vesicles on the affected arm, and only 13 on the other arm. In this case the younger brother also had an injection on the same morning, and by the evening he developed chicken-pox—i.e., seven days before his brother. His chicken-pox was milder than his brother's, and showed no special distribution.

—I am, etc.,

E. L. ELLIS.

Titchfield,
Near Fareham, Hants.

Bell's Palsy

SIR,—I was most interested to read Dr. G. A. Dalton's detailed study of Bell's palsy (June 11, p. 1765). Reference is made to the diverse aetiology of this condition.

During July, August, and September, 1959, poliomyelitis was epidemic in the province of Newfoundland. 120 cases of paralytic poliomyelitis were admitted to the Fever Hospital, St. John's. Amongst the admissions were 12 cases with an isolated facial paralysis of a lower motor neurone type. The ages of these 12 cases ranged from 1 to 17 years. Typical preparalytic symptoms were remarkable for their comparative mildness or complete absence. Rectal swabs from each case were sent for virus studies. Five yielded poliomyelitis Type 1 virus. Lumbar puncture was performed on 5 of the 12 cases. The average cell count was 29 cells, the range being from 7 to 54 cells. The protein averaged 40 mg./100 ml., the range was 23 to 50 mg./100 ml.

Poliomyelitis occurs both sporadically and in epidemic form. As the cause of an isolated facial palsy the poliomyelitis virus deserves serious consideration, especially in the under-20 age-group. If lumbar puncture reveals an elevated cell count the rectal swab may yield poliomyelitis virus.—I am, etc.,

D. SEVERS.

Department of Health,
St. John's, Newfoundland.

SIR,—We have read with interest the recent article by Dr. G. A. Dalton (June 11, p. 1765) and the letters (June 25, p. 1954) on Bell's palsy. In 1955 you published a letter of ours dealing with the treatment of Bell's palsy with vitamin B_1 (July 2, 1955, p. 58). To recapitulate, we give 50 mg. of vitamin B_1 intramuscularly once a day for 14 days, also tab. aneurin. co. fort., one tablet three times a day.

Since 1955 we have had a number of other cases, and in all we have found that the condition has started improving within five days, and that at the end of a month there has been no sign of any paralysis whatsoever, or any relapse. We have made two 8-mm. films of the condition and the response to treatment, and in both cases it has followed the same course. One was in the case of a boy of 14 and the other of a man of 36—namely, closing of the eye had improved within 3–4 days, blowing out of the cheeks was possible within 8–9 days, and wrinkling of the forehead was visible within 10–12 days.

We suggested in 1955 when we wrote our letter that this simple, cheap, and painless method should be given a clinical trial, but we regret that, so far, we have never seen a letter or paper in the *B.M.J.* about this method.—We are, etc.,

R. G. WIGODER.
H. G. JEFFS.

London, S.E.6.

Multiple Endocrine Adenomas

SIR,—Your annotation on multiple endocrine adenomas (June 18, p. 1873) accepts the pathology of this condition uncritically. It quotes three papers by Underdahl *et al.*,[1] Wermer,[2] and Moldawer *et al*,[3] as well as reviewing the more recent paper by Cooke *et al.*,[4] as evidence for this "remarkable syndrome" affecting the pituitary, parathyroids, and pancreatic islets. There is

reason to think that in many of these patients hyperplasia rather than adenoma formation is the basic endocrine gland upset.

In endocrine tissue hyperplasia may lead to true adenoma formation, and even to carcinoma, perhaps best typified by the long-term feeding of thiouracil to rats.[5,6] The hyperplasia may become nodular, with the nodules varying in size and individually often being called "adenomas." The hyperplasia of the suprarenal glands, which is the commonest cause of Cushing's syndrome, often shows a microscopic nodularity. This hyperplasia is now accepted by pathologists, but for long it was called a multiple adenomatous condition when the nodularity was marked. Pathologists, unfortunately, do not seem agreed as to what constitutes pituitary hyperplasia (though it must exist), or hyperplasia of the pancreatic islets. It has often been recorded, however, that tumours of the islet-cells may be multiple and are frequently malignant, which suggests the possibility of an underlying hyperplasia. This concept of hyperplasia of endocrine tissue leading to adenoma formation, and perhaps carcinoma, does not preclude single, or even multiple, autogenous adenomas forming and giving hypersecretion. But when multiple "adenomas" form in more than one endocrine gland at once, surely the possibility of a multiple endocrine hyperplasia is increased.

In 1958 Cope *et al.*[7] reviewed the two patients described by Moldawer and his colleagues and decided that in both the four enlarged parathyroids showed a primary chief-cell hyperplasia, a condition often showing microscopic nodularity. The father had a pituitary chromophobe adenoma, and on his death the pancreas showed at least ten small islet adenomas, a finding recently told me by Dr. Cope. This patient had severe peptic ulceration leading, after several operations, to total gastrectomy, but no evidence of hyperinsulinism. His daughter had hyperinsulinism due to two islet-cell tumours, but no dyspepsia. It was also concluded that one of Wermer's patients, described as having parathyroid "nodular hyperplasia," and six of the patients reported or reviewed by Underdahl and his colleagues, also had chief-cell hyperplasia.

Your annotator is puzzled by the high incidence of associated disorders of the upper alimentary tract in the syndrome of "multiple endocrine adenomas," but is this necessary? Once there is hyperfunction of more than one endocrine tissue the associated upsets of each of these hypersecreting tissues will be present. Hyperparathyroidism may give peptic ulceration,[8,9] and pancreatic lithiasis and recurrent pancreatitis.[10,11] Diarrhoea may then result from pancreatic insufficiency or even blockage of the larger pancreatic ducts. Renal lithiasis will be expected, and the finding of normal serum calcium and phosphate levels, and a low urinary excretion of calcium, does not exclude hyperparathyroidism (as in the patient described by Cooke *et al.*[4]).

The Zollinger–Ellison syndrome has four main characteristics—gastric hypersecretion and hyperacidity, severe peptic ulceration (often atypical), and one or more non-insulin-producing islet-cell tumours of the pancreas. It has been noted that a quarter of these patients have other endocrine tumours, including tumours of the pituitary and parathyroids. In the Zollinger–Ellison syndrome diarrhoea may result from the gastric hypersecretion,[12] or from replacement of the pancreas by tumour, with perhaps blockage of the pancreatic ducts. The finding of hypertrophied gastric rugae is presumably the *means* for the continued gastric hypersecretion and hyperacidity, and is really a hyperplasia resulting from continued stimulation of the cells of the gastric mucosa by a factor as yet undetermined.

I have already written elsewhere,[13] in a discussion on "Is Peptic Ulcer an Endocrine Disease?", in favour of a hypothalamic–endocrine syndrome, with the Zollinger–Ellison syndrome and the "multiple endocrine adenoma syndrome" as a part of it, but do not wish to repeat all my arguments here. I wish to point out that the naming of a syndrome of multiple endocrine adenomas as such can be misleading in terms of aetiology, and that your annotator seems unnecessarily puzzled by some of the side-effects encountered in these patients. His puzzlement leads him away from the aetiology rather than towards it. The question of a multiple endocrine hyperplasia must be considered, and, even more interesting, what causes this hyperplasia.—I am, etc.,

St. Bartholomew's Hospital, London, E.C.1. W. MILO KEYNES.

REFERENCES

1. Underdahl, L. O., Woolner, L. B., Black, B. M., *J. clin. Endocr.*, 1953, **13**, 20.
2. Wermer, P., *Amer. J. Med.*, 1954, **16**, 363.
3. Moldawer, M. P., Nardi, G. L., Raker, J. W., *Amer. J. med. Sci.*, 1954, **228**, 190.
4. Cooke, W. T., Fowler, D. I., Gaddie, R., Cox, E. V., Meynell, M. J., Brewer, D., *Gut*, 1960, **1**, 71.
5. Bielschowsky, F., *Brit. J. exper. Path.*, 1945, **26**, 270.
6. Money, W. L., Rawson, R. W., *Cancer*, 1950, **3**, 321.
7. Cope, O., Keynes, W. M., Roth, S. I., Castleman, B., *Ann. Surg.*, 1958, **148**, 375.
8. Rogers, H. M., Keating, F. R., Morlock, C. G., Barker, N. W., *Arch. intern. Med.*, 1947, **79**, 307.
9. St. Goar, W. T., *Ann. intern. Med.*, 1957, **46**, 102.
10. Cope, O., Culver, P. J., Mixter, C. G., Nardi, G. L., *Ann. Surg.*, 1957, **145**, 857.
11. Hoar, C. S., Gorlin, R., *New Engl. J. Med.*, 1958, **258**, 1052.
12. Summerskill, W. H. J., *Lancet*, 1959, **1**, 120.
13. Keynes, W. M., ibid., 1959, **1**, 309.

The Eye of the Premature Baby

SIR,—In 1952 and 1953 I examined 199 babies of birth weight between 2 and 6 lb. (0.9–2.7 kg.). It is possible from the records to take up the point raised in the last sentence of your annotation (July 2, p. 45): "It would be interesting to establish the validity of the belief that persistent hyaloid vessels also tend to occur frequently in premature babies."

There were 11 babies of between 2 and 3 lb. (0.9–1.36 kg.) at birth. All but one had complete hyaloid remnants from the back of the lens to the disk, one had a beautiful network of anterior and posterior vessels over the lens as well, and another a bifid remnant anteriorly. These were observed to regress and disappear, in most cases in a few weeks. In one case the remnants probably persisted.

There were 55 babies between 3 and 4 lb. (1.36–1.8 kg.) at birth. Thirty-two (58.2%) had hyaloid remnants, the majority were complete, and four of these had remnants of the posterior vascular sheath as well. These were observed to regress in a similar way.

One hundred and ten of the babies were between 4 and 5 lb. (1.8–2.27 kg.) at birth. Forty (36.4%) had hyaloid remnants; again over half were complete when first seen.

Twenty-three of the babies were between 5 and 6 lb. (2.27–2.7 kg.) at birth, three (13%) had hyaloid remnants.

At all weights remnants of the pupillary membrane were seen more frequently. This agrees with the figures given in the annotation. The regression of the hyaloid remnants almost always took the same form: they were usually very fine anteriorly, dilating suddenly about half way back into a sausage-shaped posterior portion. Progressive thinning resulted in a break anteriorly and the remainder then became coiled into a spiral just in front of the optic nerve head where final absorption took place. I never saw a blood column in any of them, although one occasionally sees this in older patients with persistence of this system.—I am, etc.,

Birmingham, 15. M. J. ROPER-HALL.

Sludged Red Cells

SIR,—Sludging of red cells (June 18, p. 1874) has received very little attention in British medical literature so far. I have been studying the phenomenon clinically for some time in connexion with its relationship to post-operative complications. One of the difficulties is to differentiate true sludging of red cells microscopically from transient rouleaux formation occurring in the capillaries due to the slower flow in them; in fact, any venous stasis and even a low cardiac output will favour the appearance of "sludged blood."

From my own observations and those of others,[1] heparin and anticoagulants certainly do lessen, and may even abolish, such red-cell agglutination. I think that red-cell agglutination and its possible effects in the body are avoided during the relative hypotension of extra-corporeal circulation by the complete heparinization that is necessary. It is also probable that such full heparinization would prolong the safe period of circulatory occlusion under hypothermia—as Crowell *et al.*[2] showed in normothermic dogs—unfortunately the fear of bleeding tendencies has so far prevented one from trying.

Sludging of red cells is a subject concerning which a warning is needed, it being a basic reaction common to all injuries. It is very easy to ascribe many lesions to it, in fact all manner of aetiological claims have already been made; nevertheless, as your annotation suggested with justifiable caution, could it be abolished many facets of disease might be modified beneficially.—I am, etc.,

H. F. M. BASSETT.

Department of Thoracic Surgery,
Shotley Bridge General Hospital,
Co. Durham.

REFERENCES

1 Borgström, S., Gelin, L. E., Zederfeldt, B., *Acta chir. scand. Supp.*, 1959, 247.
2 Crowell, J. W., Sharpe, G. P., Lambright, R. L., and Read, W. L., *Surgery*, 1955, **38**, 696.

Diuretics and Gout

SIR,—Your annotation calling attention to the disadvantages of the newer oral diuretics in relation to uric acid excretion (July 2, p. 45) is very welcome, but tends to confuse two different processes. The first is the apparent precipitation of acute gout arthritis in gouty people by a large number of different "upsets," including the administration of drugs. The second is the induction of hyperuricaemia by a growing number of drugs, by no means limited to individuals with a gouty history or family history. This is a disadvantage which may apply with particular force to those with renal disease. Price's study,[1] which you note, was of the mercurial diuretic, mersalyl, which, in common with corticosteroids, salicylates, and probenecid, reduces the level of the serum urate, and belongs to the first type.[2] The diuretics chlorothiazide and hydrochlorothiazide, the antibiotic pyrazinamide, and the anti-hypertensive drugs mecamylamine and pempidine[3] are of the second type which increase serum urate levels and depress urate excretion. Acute gouty arthritis may follow if the hyperuricaemic drug is continued long enough.

Elsewhere[4] evidence has been assembled that hyperuricaemia is damaging to the kidneys, even in the absence of gouty arthritis; and, since both renal disease and hypertension are common in gout, we have been studying pharmacological interrelationships of these various drugs. Our experience would not entirely agree with your suggestion that probenecid should be selected to counteract drug-induced hyperuricaemia. In pyrazinamide hyperuricaemia it is ineffective, and in chlorothiazide hyperuricaemia it is certainly no more effective than 428 grammes of the much cheaper salicylates.—We are, etc.,

A. ST. J. DIXON.
B. L. J. TREADWELL.

Postgraduate Medical School of London,
Hammersmith Hospital,
London, W.12.

REFERENCES

1 Price, N. L., *Lancet*, 1939, **1**, 22.
2 Talbott, J. H., *Arthr. and Rheum.*, 1959, **2**, 182.
3 Dollery, C. T., and Duncan, H., *Brit. med. J.*, in press.
4 Duncan, H., and Dixon, A. St. J., *Quart. J. Med.*, 1960, **29**, 127.

Rare Sacrococcygeal Teratoma

SIR,—Congenital tumours of the sacrococcygeal region have been reported by Calbet[1] to occur once in every 34,582 births, and of these tumours teratomas represent only a small percentage. To date there are approximately 450 cases described in the literature, 75% of which have occurred in females. The incidence of malignancy is about 15%, there being a high rise in malignant potential the longer the tumour remains *in situ*. Hickey and Layton[2] showed that there was a 95% benign character up to four months after birth with a rise to 65% malignancy by the age of two years. Therefore, total excision of the tumour is advised as soon as the diagnosis has been made and the child's condition permits. Neither prematurity nor the neonatal period contraindicate surgery. Tumours composed predominantly of neural tissue are more apt to recur and metastasize (to liver, lungs, bone, and lymph nodes). The commonest type of malignancy is a papillary adenocarcinoma.

A four-months-old male Hausa child was admitted to the City Hospital, Kano (Northern Nigeria), on December 29, 1959, with a large swelling over the lower part of its back. From the caudal extremity of this swelling there was a more or less fully formed lower limb from the knee distally, which the child was able to move voluntarily. At its cephalic extremity the swelling exhibited the appearance of an adult female mammary gland (see Fig.).

X-ray Report.—"Pelvis and thoracolumbar spine: There is a supernumerary lower limb growing from the left hindquarter, where there is a large soft-tissue tumour. The two hip-joints appear relatively normal as regards the proximal ends of the femora, but there is maldevelopment of the left acetabular shelf adjacent to the extra limb. On the posterior aspect of the left ileum there is a spur of bone, which probably represents a rudimentary femur. The supernumerary limb has a tibia, two tarsal bones, three metatarsal bones, and some phalanges. On investigation of the spine hemivertebra was demonstrated at L 1 level and there are other defects of development of vertebral bodies between

T 10 and L 3 inclusive. Spina bifida is suspected in association with the posterior soft-tissue tumour as the pedicles of the lower lumbar spine are abnormally widely spaced. Heart and lungs normal. Liver on the normal side. No definitive abnormality of bowel gas shadows seen."

On January 7 operation was carried out. In the line of the extra limb an incision was made extending from the iliac crest of the baby downwards. The upper portion of the femur in the supernumerary limb was of fibro-cartilaginous tissue and was united to the pelvis of the baby by a false joint. The limb together with its bone, muscles, and fascia was removed and the body fragments of the false joint were scraped off. There was much areolar and fatty tissue present in the area. As the patient's general condition was not satisfactory, and he did not react well to the anaesthetic, it was decided to do the minimum at the present, and the wound was closed. Twenty ml. of blood was given through the anterior fontanelle during the operation. The child was given post-operative antibiotic therapy, and, after an uneventful recovery, was discharged on January 18.

This was an unusual case in that the tumour contained a more or less fully formed lower limb, and that part of it below the knee was visible at clinical examination. In an exhaustive search of the literature[3-7] I can find no reference to the presence of a lower limb in such a tumour. There are, however, numerous references to the presence of an upper limb or portions of an upper limb or supernumerary pelvic bones. Just how many of these cases have occurred in the population of Northern Nigeria would be difficult to estimate, but, judging from the interest shown by the press in Kano, I would conclude that it must be a very rare occurrence.

My acknowledgments to Dr. J. C. Chartres and K. D. Ray, both of the City Hospital, Kano; and also to the adviser to the Ministry of Health, Northern Nigeria, for permission to publish this paper. The photograph was taken by Dr. E. Michalski.

—I am, etc.,

Maiduguri, Northern Nigeria. J. R. PURSER.

REFERENCES

1 Calbet, J., *Contributions à l'étude des tumeurs congénitales d'origine parasitaire de la région sacro-coccygienne*, 1893. Paris, G. Steinheil, p. 80.
2 Hickey, R. C., and Layton, J. M., *Cancer*, 1954, **7**, 1031.
3 Seidenberg, B., and Hurwitt, E. S., *A.M.A. Arch. Surg.*, 1958, **76**, 429.
4 Hanbery, J. W., Seinz, E. H., and Jeffrey, R. A., *Stanf. med. Bull.*, 1958, **16**, 154.
5 Ravitch, M. M., and Smith, E. I., *Surgery*, 1951, **30**, 733.
6 Kirk, G. D., *Amer. J. Surg.*, 1958, **95**, 1015.
7 McConnell, E., *J. Pediat.*, 1958, **53**, 489.

Congenital Dislocation of the Hip

SIR,—The letter by Mr. Denis Browne (February 20, p. 564) on congenital dislocation of the hip prompts me to mention some personal experience. He stresses the fact that this disease can be diagnosed at birth by testing for limitation of abduction. I was not aware of this simple test until I attended a talk given by Dr. Douglas McKay, of Adelaide, to the S.E.M.A. (South Australian Country Branch of B.M.A.) in February, 1956. I resolved after hearing him speak to include this simple test in my examination of babies a few hours after birth. To my surprise I discovered two newborn babies (in October, 1957, and January, 1958) who gave an abnormal response to abduction of the hip. One had limitation of abduction of the hip, and both gave an audible click on abduction. They were examined radiologically and under general anaesthesia by Dr. McKay, who considered they both had congenital hip dislocation. They were treated in abduction splints, and I am pleased to record they are now both walking quite normally.

I mention these cases in the hope that other G.P.s not already aware of this simple test will apply it routinely after birth and help to eliminate what can prove a crippling disease if not discovered early.—I am, etc.,

Naracoorte, South Australia. DAVID J. DALY.

Care of the Old

SIR,—I would like to support Dr. Barrow in the views expressed in her letter (July 2, p. 66). She has put her finger quite firmly upon the whole failure of the general practitioners' service in the N.H.S. so far. It has taken almost ten years for the hospital service itself to appreciate the saving in labour and indeed even the size of its out-patients departments that can be achieved by offering full access to the diagnostic services such as radiology and pathology. The local health authority in some areas has shown some half-hearted attempts to co-operate, but there has at no time seemed to have been an all-out attempt by anybody to put services in the way of the general practitioner trying hard to improve his work.

In an earlier letter Dr. J. Maddison (May 21, p. 1565) speaks of extending the local health authority activities in the care of the elderly. I must most certainly deprecate this. As Dr. Barrow says, general practitioners can look after these people, but with the increasing size of the ageing population and the fact that rather more than 50% suffer from social conditions for which facilities are all too short, it is still defeating him.

In another part of her letter, Dr. Barrow suggests that the G.P. requires a financial incentive to extend his work in the geriatric field and hopes that this will be borne in mind by the Working Party in discussions with the Minister, but she also makes the valid point that, the more the G.P. earns through local health authorities, the greater will be the suffering of the Central Pool.

I think perhaps—as I have always thought—that the purpose of the local health authority should be to maintain a team of ancillary workers in the general-practice field and to concentrate upon health education. If this were achieved, the general practitioner would indeed be well off, and the patient would have no doubt as to where he should go to obtain the best service.—I am, etc.,

London, S.E.6. R. LL. MEYRICK.

Mental Health Tribunals

SIR,—As one who entered psychiatry from general practice and the public health service, I can sympathize with the sense of misgiving and of injustice concerning the mentally ill or subnormal referred to by your correspondent Dr. F. E. Graham-Bonnalie (June 18, p. 1888). Perhaps he may derive some comfort that, although I cannot give statistics, I believe very many psychiatrists started their careers in other fields, especially in general practice. Difficulties which arose in the past were, in my personal view, due to insufficient medical staffing in this time-consuming specialty. To regard psychiatrists as gaolers is evidence of being out of touch with contemporary psychiatry and may well be an unfair commentary on generations of physicians.

While the new Mental Health Act was being discussed, as a proposal, every psychiatrist, no matter what grade, had the opportunity of giving views of improvement in the legal aspects of detention in hospitals. The result has led to changes which facilitate the entry and exit of patients to and from hospitals caring for the mentally

ill or subnormal. Much freedom was already available and made use of previously, where adequate home care could be offered. Even in the reign of Queen Elizabeth I physicians were not unaware of the home-care factor, and in the last century freedom during institutional care and the home-care factor were considered for alcoholism.

Psychiatry, with its somewhat nebulous symptomatology, has always provided a bait for the uninstructed. Now it is keeping pace with general and medical scientific advancement. Nevertheless, the sum total of clinical assessment can only come from experience, and this includes experience of the whole psychiatric team in which there is a very definite part for the general practitioner. The general practitioner can hardly expect to act as an expert at a tribunal on a psychiatric case assessed and treated in a special hospital, but he can expect to have contributed his findings on the case, with a clear, concise history and full details of the therapy he provided. The expert has been able to make his assessment under given conditions and these conditions must have provided adequate diagnostic and therapeutic facilities including sufficient numbers in the teams concerned. The Minister is responsible for these conditions as well as the tribunals. The responsible public can keep its watchful eye.—I am, etc.,

Winchester, Hants. M. HUTCHINS.

Tropical Pulmonary Eosinophilia

SIR,—We have read with interest the comments of Dr. K. Sundram (April 23, p. 1276) on our article on diethyl carbamazine in tropical eosinophilia (January 9, p. 100). We should like to point out that this preliminary trial of parenteral "unicarbazan" (diethyl carbamazine) was conducted before a modified form was put on the market for general use. The original preparation used by us contained 800 mg. of diethyl carbamazine citrate and was meant to be administered as a single dose. This was only a preliminary trial to find out appropriate dosage and side-reactions. On receiving a report from us and others, the Unichem Laboratories decided to cut down the dosage to 400 mg., and before the drug was released on the market an antihistaminic (diphenhydramine hydrochloride) was added to minimize the side-effects seen by us. Later on chlorpheniramine maleate replaced diphenhydramine hydrochloride. This has much minimized the side-effects. We are still conducting the trials with the new modified preparation and shall soon publish the results.—We are, etc.,

Bhopal, India. AJAI SHANKER.
R. K. BHARGAVA.

"Imferon" and Cancer

SIR,—There is an increasing awareness of factors which may be responsible for the development of certain forms of malignant disease. There is also evidence that some common foodstuffs and widely used drugs can, in certain circumstances, induce the formation of tumours in one or more species of laboratory animals. It is against this background that new reports of carcinogenicity must be judged. The most recent of these is the evidence that iron-dextran complex ("imferon") is capable of giving rise to sarcomas at the sites of repeated injections of massive doses in rats and mice. This evidence was considered sufficient to warrant a demand for the withdrawal of imferon from any kind of general use in man (leading article, *Brit. med. J.*, 1960, **1**, 788).

After carefully considering the available data in connexion with the carcinogenicity of iron-dextran complex we have concluded that its use in the clinical dosage recommended carries a negligible risk, and is probably less hazardous in other respects than intravenous iron preparations and blood transfusions. In our opinion, provided that the presence of severe iron deficiency has been clearly established and provided oral iron cannot be employed effectively, the injection of iron-dextran complex is fully justified, and practitioners in this country and abroad need not be deterred from using the drug.—We are, etc.,

Rheumatic Diseases Unit, Northern General Hospital, Edinburgh. J. J. R. DUTHIE.
Department of Medicine, University of Edinburgh. R. H. GIRDWOOD.
Department of Paediatrics and Child Health, Children's Hospital, Birmingham. DOUGLAS HUBBLE.
Department of Materia Medica and Therapeutics, University of Aberdeen. A. G. MACGREGOR.
Department of Medicine, Gardiner Institute, Western Infirmary, Glasgow. E. J. WAYNE.
Department of Pharmacology and General Therapeutics, University of Liverpool. ANDREW WILSON.
Department of Pharmacology and Therapeutics, University of Sheffield. G. M. WILSON.

*** At the request of the Food and Drug Administration, Lakeside Laboratories, Inc., who market imferon in the U.S.A., have temporarily withdrawn the drug.—ED., *B.M.J.*

Late Lactation

SIR,—I was interested in the letter of Dr. Margaret and Mr. Anthony Barker (April 20, p. 1365) describing a case of late lactation. This week, in my practice in this somewhat backward area of the Niger Delta, I saw a woman who was still lactating, though her only child was born about thirty years ago. The woman must be at least 45 years old; she is still having regular menstruation. She had suckled no one but her son until three years ago, when her daughter-in-law died a week after childbirth and she began to breast-feed her granddaughter; and, indeed, is still breast-feeding her.

By her reaction to my questions, I gathered that this is quite a common phenomenon in these parts. Women apparently bathe their breasts with native medicine to keep the milk in.—I am, etc.,

Via Ughelli, Western Nigeria. ANNE F. PHILLIPS.

Carpal-tunnel Syndrome

SIR,—I was most interested in Dr. R. S. Crow's review of the treatment of the carpal-tunnel syndrome (May 28, p. 1611), as I have been using oestrogen in small doses for this extremely painful condition ever since one menopausal patient reported the disappearance of the condition after I had given her 0.3 mg. of stilboestrol daily for the disturbing hot flushes she complained of in addition.

Since that time I have treated a further five cases in menopausal women, one occurring in pregnancy, and the syndrome occurring in an elderly man. Of the menopausal

cases, four out of the six experienced immediate relief, which persisted after a course of 0.3 mg. daily for a short period, usually two or three weeks. When one of these women had a recurrence of the syndrome many months later, a further short course again obtained a remission of symptoms. The case occurring in pregnancy also cleared up rapidly and she is still well. In the two cases who failed to get any relief, it seemed likely that the original diagnosis was wrong and that they were in fact cases of cervical spondylosis; one of them subsequently underwent treatment by immobilization in a collar. In the case of the elderly man whose symptoms were very troublesome and in whom discreet inquiries revealed that treatment by oestrogen would not disrupt domestic bliss, 15 mg. of stilboestrol daily for a short period also produced remission of symptoms, and, when they too recurred after many months, a further short course was again effective.

I report this in view of the safety of these smaller dosages and, in my limited experience of the condition, high degree of rapid improvement.—I am, etc.,

Kingston-on-Thames. GWILYM EVANS.

Epidemic Bronchiolitis in Infants

SIR,—While recognizing the possibility that bronchiolitis (epidemic in infants) in the United Kingdom may be different from bronchiolitis in this country, I feel that I must protest against the thesis and conclusion that all such cases are infective. I refer to the article by Dr. M. E. Disney and his colleagues (May 7, p. 1407).

From a study of their report, it seems certain that a large proportion of their patients were not suffering from infective disease. Indeed, the best results occurred in those patients who received no antibiotics. The authors' descriptions of the pathology in several of the fatal cases revealed no evidence of pyogenic infection and no definite evidence of a viral agent either. From the list of *x*-ray appearances one could argue that no less than 77% of their cases were non-infective.

It must be pointed out that pyrexia in the young can be caused by many things apart from infection. Of these other causes, asthma is one. I refer also to your annotation in the same issue on "Fatal Asthma" (p. 1421), and suggest that this should be studied in conjunction with the article on "Epidemic Bronchiolitis in Infants." The sparse pathological details given are remarkably similar in both and indicate what a killer asthma can be in cold and smoggy countries. Finally, may one suggest that Dr. Disney and his colleagues, in addition to antibiotics, try the use of ephedrine, sedation, rehydration, and perhaps the steroids in their next "epidemic"?—I am, etc.,

Sydney, Australia. S. E. L. STENING.

Purgatives and Laxatives

SIR,—I found myself so much in agreement with Professor Alastair Macgregor (May 7, p. 1422) in his article on purgatives and laxatives (especially the first half of it) that I felt inclined to write and express my appreciation. I have often felt that there ought to be some control over advertising of aperients, but I suppose that is impossible.

I do not think there are so many weekly purges given as there used to be, but, speaking from the point of view of a child-welfare officer, there are still too many babies given "milk of magnesia" (magnesium hydroxide)—a name cunningly chosen. This is sometimes recommended by the health visitor, district nurse, or family doctor. Maybe sometimes the family doctor finds it recommended at the clinic (not mine, I hope)—I don't know about that. More often, though, aperients are given to the poor baby or child because a relative advises it—the advertising is superb.—I am, etc.,

Barton Seagrave, Kettering. MURIEL C. GOODCHILD.

Age of Consent

SIR,—From the letter (June 25, p. 1955) under the heading "Disfiguring Tattoo," it appears that there is still a widespread belief that a patient must attain the age of 21 before being regarded as capable of signing an anaesthetic consent form, though I have never heard of objection being made to a parent of, say, 20 years old consenting to an operation on his or her child. Recently the secretary of the Medical Defence Union stated in a lecture, which he later summarized,[1] that young adults between the ages of 16 and 21 must consent themselves to undergoing operations and anaesthetics, and suggested that, although it is wise (if convenient) to obtain a parent's consent as well, if there should be disagreement between the patient and his parent the law would uphold the patient should an action for assault or negligence result.

All this is very important: in the case quoted in the letter I refer to, a young married girl may have been subjected to quite unnecessary embarrassment through having to obtain consent for an operation which was entirely her own affair; every week-end dozens of young people fall off motor-cycles, and much time is wasted trying to locate their parents in order to obtain permission for operations which may be urgent; and it is easy to imagine cases in which ignorant parents may deny the benefits of blood transfusion to their children in dire need, though the latter may have attained the age of 16 and long ago have decided not to share their parents' prejudices.—I am, etc.,

Colchester. J. N. FELL.

REFERENCE

[1] Addison, P. H., *Brit. med. J.*, 1960, **1**, 976.

Spiritual Healing in Hospitals

SIR,—I wonder how many of the members of the hospital management committees who have accepted "spirit" healers subscribe to medical missions in order to free the natives from the witch doctors? If they would read Mr. Edwards's book they would have to admit that they have allowed their emotions to obscure their judgment. There is a fundamental difference between "spiritual" and "spirit."—I am, etc.,

Warminster. CHARLES E. KINDERSLEY.

*** This correspondence is now closed.—ED., *B.M.J.*

Heredity in Glaucoma

SIR,—The following cases have occurred in my practice in the last 30 years: (1) father and daughter; (2) father, one son, and two daughters; (3) father, son, and grandson. If this is generally known, earlier diagnosis will be possible.—I am, etc.,

Melbourne, Australia. A. P. LAWRENCE.

POINTS FROM LETTERS

"Cancer of the Skin"

Dr. H. CLIVE SIMS (Oldchurch Hospital, Romford) writes: Dr. F. Ray Bettley in his letter (June 11, p. 1811) states that "radiotherapy is usually carried out by radiologists in the United Kingdom." Dr. Bettley is mistaken: radiotherapy, in this country, is *never* carried out by radiologists, but by radiotherapists.

Obituary

ANEURIN BEVAN

Mr. Aneurin Bevan, who was Minister of Health in the Labour Governments during 1945–51, died on July 6. He was aged 62. The sympathy of the medical profession was with him and Miss Jennie Lee, his wife, when it learnt that a severe abdominal operation had to be performed as a matter of urgency now many months ago. His stature as a man and as a politician may be measured by the volume and the sincerity of the tributes paid to him by the national press and by his colleagues of all parties in the House of Commons. In the medical profession he aroused feelings of profound admiration and equally profound antagonism. An attempt to assess the part he played in providing the people of Britain with organized medical services is the subject of a leading article at page 201.

Lord MORAN writes: When the Bill for a National Health Service was first mooted by the Labour Government, I confess that I had an open mind. I went to Lord Waverley for counsel, because he was a wise man and in the inner circle of the Conservative Party. What would happen, I asked, if the doctors decide to fight? "They will be very unwise if they dig in against this service." Waverley said this very slowly and very deliberately. "If," he went on, "Labour does not bring in a health service, the Conservatives will, when they get the chance. This Bill is going to come in either with the co-operation of the doctors or over their heads."

There was really no alternative, and if the Service was inevitable, it at once became important, if the doctors were to have any say in things, that Bevan, as Minister of Health, should look upon them as allies and seek their advice. I felt that we should have a much greater say in things if we could establish a friendly approach to the Minister, for he had a way of dividing up the world into those who were for him and those who were against him. If he looked on you as a friend things began to happen, for he had great power in his Party. If you could convert him, it was not necessary to bother about anyone else, for, unlike most Ministers, he himself made all the decisions that mattered. He would listen to what you had to say, and when you had done give you his decision. Nor would he change his mind a few days later because his civil servants had intervened.

I recall a conversation with Bevan at that time which is, I think, typical of the man.

Bevan: "I find the efficiency of the hospitals over the country varies enormously. How can that be put right?"

Moran: "You will only get one standard of excellence when every hospital has a first-rate consultant staff. At present the consultants are all crowded together in the large centres of population. You've got to decentralize them."

Bevan: "That's all very well, but how are you going to get a man to leave his teaching hospital and go into the periphery?" He grinned: "You wouldn't like it if I began to direct labour."

Moran: "Oh, they'll go if they get an interesting job and if their financial future is secured by a proper salary."

Bevan (after a long pause): "Only the State could pay those salaries. This would mean the nationalization of hospitals."

Bevan would go away and try out my arguments on someone else. That was how he got his information—by talking to people. He could not be bothered to study documents. His critics among the doctors complained that he would not sit down and think out their problems. That was not his way. What he accomplished—and it was no small achievement—came by other means.

Bevan was at no time a cold, calculating politician—indeed, he did his best on more than one occasion to commit political suicide. He had not what Maynard Keynes called "instinctive judgment." He wanted passionately to change the face of society that his own people might live more in the sun, but he did not seem at all clear what he wanted to put in its place. And yet when he rose to address the House of Commons members flocked into the Chamber. Can anyone tell us the reason why?

Bevan was a man apart. I would go to him with some measure, bent on converting him. He would come to the heart of my case almost before I had put it to him, and then, when it was out of the way, he would abruptly change the subject. Perhaps he would launch into a disquisition on the mechanism of pain, remarkable in its detailed accuracy. Conversation was meat and drink to him. And, after all, it is the colour and magic of Bevan's personality, what he was, and not what he did, that men will remember.

SEYMOUR G. BARLING, C.M.G., M.S., M.Ch. F.R.C.S.

We record with regret the death of Professor S. G. Barling, emeritus professor of surgery in the University of Birmingham, at his home near Worcester on July 4. He was 79 years of age.

Seymour Gilbert Barling, a well-known surgeon and wise man of affairs, was born at Eastington, Gloucestershire, on November 2, 1880, and was the nephew of the late Sir Gilbert Barling, who in his day was the most distinguished surgeon in the Birmingham district and one of the most prominent figures in the University of Birmingham. Seymour Barling was educated at the Haberdashers' School, London, and entered the Birmingham Medical School in 1898 with two men who were to be his lifelong friends and colleagues—Leonard Parsons and Beatson Hird. He qualified M.R.C.S., L.R.C.P. in 1903, taking the M.B., B.S. degrees of the University of London in the following year. In 1905 he became a Fellow of the Royal College of Surgeons of England and in 1909 he obtained the London M.S. He took the degree of M.Chir. of the University of Birmingham in 1932.

After qualification he became private assistant to his uncle, a position he held for 20 years, during which time he gained an enviable experience of all types of surgery. He was soon elected to the honorary staff of the Birmingham Children's Hospital and later joined the staff of the Guest Hospital, Dudley, and the General Hospital (later Queen Elizabeth Hospital), Birmingham. A keen "volunteer" in his youth, Barling served throughout the first world war, first in command of the 2nd South Midland Field Ambulance (T.A.) and subsequently as surgeon to the 26th General Hospital. Later he was consulting surgeon to the B.E.F.

Seymour Barling was appointed professor of surgery in the University of Birmingham in 1931, a post he filled with distinction until he retired in 1946. He was subsequently appointed emeritus professor. He was a member of the British Medical Association for 54 years, and at the annual meeting at Birmingham in 1911 he acted as honorary secretary of the section of diseases of children and he was a vice-president of the same section at the annual meeting at Belfast in 1937. He filled the office of president of the Association of Surgeons of Great Britain and Ireland when it held its annual meeting at Birmingham in 1934. In 1935 Barling was elected a member of the council of the Royal College of Surgeons of England, on which he served for eight years. He was also a member of the court of examiners from 1939 to 1945. He played a part in the negotiations which led up to the amalgamation of the

General Hospital with the Queen's Hospital in Birmingham, and his experience and wisdom were of service at the time of the introduction of the National Health Service. For a time he was chairman of the South Worcestershire Hospital Management Committee. He did not write a great deal, but was best known for the part he took as joint editor of two well-known books, *A Manual of War Surgery*, published in 1919, and *Diseases of Infancy and Childhood*, published in 1933—a second edition of which, edited jointly with Dr. Clifford Parsons, was published in 1954.

Seymour Barling was a surgeon of reliable judgment and of sound rather than brilliant technique. He was very ready to listen to the views of others and was modest though firm in expressing his own opinions. He had a happy sense of humour and a quiet twinkle in his eye could often be detected. He was of a friendly disposition and thoroughly enjoyed his travels with the Moynihan club, of which he was a faithful member. He worthily carried on the great tradition which had been built up over such a long period by his uncle, Sir Gilbert Barling.

H. W. F. writes: Seymour Gilbert Barling was the son of Frank Barling, farmer, and nephew of Sir Gilbert Barling, Bt., to whom he was assistant, and, surgically, successor. During sixty-two years (1884–1946) surgery in the Midlands owed a very great deal to the Barlings, who, though physically not unalike, possessed strong and capable personalities cast in different moulds. Contemporary judgment almost certainly would say that Gilbert Barling was the leading pioneer in the revolution which brought modern operative surgical technique to the Midlands, while Seymour Barling used his full influence to induce the Birmingham Medical School to give fuller opportunities to juniors for responsible practice and for research. In the days of his maturity the targets for training and the standards of sound investigation were far more clearly defined than in his youth.

Barling's contributions to the surgical treatment of goitre and for the relief of ailments of the stomach of the newborn were recognized as specially important. When he was Professor of Surgery in Birmingham University he put his full enthusiasm into the huge problems connected with planning, building, and opening the Queen Elizabeth Hospital. He held high the standard of sound surgery, and he wrought perhaps better than he knew, by his practice and by his character. He served his country, his university, his hospitals, and his patients with unswerving loyalty and never-failing interest; he was a staunch friend and a kind-hearted man. He did not seek to be a genius, nor did he have those qualities, but he tried hard to live a well-balanced life professionally and in private life, and in that he succeeded to a degree which his friends will not forget.

Barling had retired from active surgical practice before the inception of the National Health Service in 1948, but he was able to render valuable service as chairman of the South Worcestershire Group Hospital Management Committee from its start until he retired at the age of 75. A remarkably well attended luncheon at Droitwich then gave proof of the widely felt appreciation by the hosts and the cheerful vigour of the guest. Golf and fishing amused him, but his heart was in the countryside. He farmed and he was a good gardener, but in particular he was a man of the woods. The natural history of trees and growing trees in his plantations gave him much pleasure in his later years.

Seymour Barling married Gladys, sister of his late surgical colleague and friend Percival Mills. Their daughter, Miss Elizabeth Barling, has achieved distinction as an industrialist, and their two sons, both members of the medical profession, served with distinguished gallantry in the last war.

Dr. H. B. TRUMPER writes: Seymour's death will mean a deep personal sorrow to all his colleagues and the many hundreds of us who served under him. It is as one of his old house-surgeons I write this tribute, particularly to put on record his work to improve the conditions of patients in hospital, and in this he was years ahead of his time. He would inspect patient's meals like a good C.O.—which indeed he had been—and encouraged his ward sisters to keep patients cheerful with books and papers and some creative amusement. He was a real champion of the nurses, and it was due to him that their working conditions were so much improved. He believed and taught that the surgical treatment of a patient was not only the technical skill of the surgeon, but just as important were good food, comfort, and reassurance.

He practised in what may well become known as the inquisitive age of surgery. Anaesthesia and instrumentation were improving to allow greater surgical exploration. Seymour admired these things, but he had a greater admiration for natural regeneration and repair. Often at the end of an examination he would push up his glasses, a familiar gesture, and say, "Leave alone, leave alone." From time to time he had to face a patient for whom nothing more could be done and who would never be well again. We all know these cases, the name of the disease doesn't matter, but I have seen anxiety and fear lift from a patient's face when Seymour said to him, "Don't forget, we're all in this together." There must be hundreds like me who, while they live, will think back with thankfulness to that strong, handsome, charming man with all the skill of surgery in his hands and the whole sense of healing in his mind.

H. SEAWARD MORLEY, M.D., F.R.C.P.

Dr. H. Seaward Morley, senior physician to the Royal West Sussex Hospital, Chichester, and a past Master of the Society of Apothecaries, died suddenly on July 5 while on holiday in Pembrokeshire. He was 63 years of age.

Henry Seaward Morley was born on March 16, 1897, the son of Henry Forster Morley, D.Sc., and Ida Rose Morley. He was educated at University College School and University College, London, and received his medical training at University College Hospital. His education was interrupted by the first world war, in which he served as a combatant with a commission in the R.F.A. He qualified M.R.C.S., L.R.C.P. in 1924, took his M.B., B.S., London, in 1925, and proceeded to the M.D. in 1929. He gained the M.R.C.P. in 1927 and was elected F.R.C.P. in 1948. After qualification he held a series of house appointments at U.C.H., finally becoming resident medical officer and medical registrar.

Morley's family had been long established in West Sussex, at Midhurst, and in 1932 he returned there and was appointed physician to the Royal West Sussex Hospital, Chichester. He soon built up a reputation as a consultant, with a special interest in diseases of the chest, and his services were greatly in demand. Later he became physician to St. Richard's Hospital, Chichester, the Haslemere and District Hospital, and consulting physician to Graylingwell Hospital, Chichester. Morley was greatly attached to the Worshipful Society of Apothecaries of London. He became a Yeoman of the Society in 1919, later proceeding to the Livery, and was elected to the Court of Assistants in 1943. It afforded him intense pleasure when he became Master in 1953–4. He had a fine presence and sense of tradition which, with his other qualities, amply justified his choice for this office. He served his profession well in the committee room and took an active part in the discussion which preceded the National Health Service. He represented the Society of Apothecaries on the committee which represented the profession in its discussions with the wartime coalition government on the formation of a national health

service as part of the provisions of the Welfare State envisaged in the Beveridge report. He continued to represent the Society on the negotiating committee which succeeded the representative committee in 1944 and remained in being until 1949. In 1952 he was appointed a Crown representative on the General Medical Council.

Morley married in 1934 Alison Kathleen, daughter of the late Major Rowland Hill. He is survived by his widow and two sons.

G. A. E. writes: The sad, unexpected death of Seaward Morley while away on holiday has been a great shock to the profession in West Sussex, and especially so to the Royal West Sussex Hospital—a building that he loved so much and on whose behalf he did so much good. We worked together there for nearly a quarter of a century, and I can pay tribute to his unfailing courtesy and good humour: indeed, I cannot remember a hard word during the whole of that time, and his advice and good counsel, both medical and political, were free to all who asked. I shall be always grateful for the great help that he gave me over the years, as I am sure also will many others.

Apart from his clinical work he was an ardent committeeman. He was a tower of strength in the board-room, where he continually championed the rights of the profession, the privileges of the patients, and the maintenance of proper etiquette, and he was ever keen to search out and repel the advances of bureaucracy and officialdom in matters clinical. The numerous pencilled notes and alterations on his agenda showed the time and thought that he gave to these matters in spite of all his other activities. Up till quite recently he was tireless, and his walking feats on holiday were the bane of his family and the wonder of us all, as were his efforts at his Christmas parties. He was extremely fond of entertaining, and with his charm of manner and his courtesy he was an excellent host. It is tragic that he was not spared to enjoy a little of his well-earned retirement at his cottage in far-off Wales, for he was above all a family man, intensely fond of his home.

ERNEST BRAZAO, L.M.S.S.A., L.R.C.P.&S.Ed.

Dr. Ernest Brazao died at his home at Port-of-Spain, Trinidad, on April 20, after a short illness.

Ernest Brazao received his medical training at the Middlesex Hospital, qualifying L.M.S.S.A. in 1921, and two years later he obtained the Scottish triple qualification. In October, 1925, he was appointed assistant medical officer in British Guiana, but he returned to England in 1929 to enter general practice at Cricklewood, in north-west London, where he remained until 1942. Thenceforward he was in practice in various parts of England until 1948, when he went to Port-of-Spain, Trinidad, to become medical officer of prisons in the island. There his cheerful and sympathetic nature made him popular with the prison officers and prisoners alike, and his conscientiousness earned him their respect. Prison officers formed a guard of honour at his funeral, and at the service tributes were paid to him as a doctor and as a man. He leaves a widow and two daughters.

J. E. MEASHAM, M.D.

Dr. J. E. Measham, well known as a malariologist in India, died suddenly during a medical meeting at Newcastle upon Tyne on May 24. He was 69 years of age.

John Eric Measham was born on March 7, 1891, the son of the Rev. R. Measham, *M.C.*, R.N., rector of Bellingham, Northumberland. On leaving the Royal Naval School, Eltham, he entered Durham University in 1909, graduating M.B., B.S. in 1915 with first-class honours. He proceeded M.D. in 1938, having earlier been elected a Fellow of the Royal Society of Tropical Medicine and Hygiene. After qualification he worked as a house-surgeon in the Royal Victoria Infirmary and then joined the R.A.M.C., seeing service in West Africa, where his interest in malaria was aroused.

At this time malaria accounted for millions of deaths each year in the Tropics, so Measham resigned his commission and was attracted to pioneer work on the tea estates of the Madras Presidency. In 1933 he returned to England to work in the Ross Institute in Putney under Sir Malcolm Watson, after which he opened a research centre in Southern India at Valparai in the region of the South-western Ghats. After the dissection of hundreds of mosquitoes, Measham and his team proved that *Anopheles fluviatilis* was the dangerous carrier of malaria in the Anamallais region, enjoying as it did optimum conditions for survival along the grassy banks of slow-flowing streams. His book, *The Transmission and Prevention of Malaria on the Tea Estates of the Madras Presidency* (1939), reads like a detective novel. To achieve his purpose he borrowed elephants to clear fallen trees from streams, and supervised the construction of dams, sluices, drains, and wells in a systematic assault on his enemy, changing entirely the principles of practice where he worked to the lasting advantage of the region. In eight years the death rate at Velonie fell from 10% to 1%. This region was formerly known by the coolies as the "valley of death."

It was with an established reputation as a malariologist that Measham rejoined the R.A.M.C. in 1939, subsequently to command No. 8 and No. 2 Malaria Field Laboratories under battle conditions in Tunisia. In 1946 he was made officer commanding troops in hospital ships with the rank of lieutenant-colonel, completing his service as A.D.M.S. Western Command, with headquarters at Taunton. On return to civilian life he lived quietly, enjoying his home and friends in Newcastle upon Tyne, where he acted as consultant in tropical medicine to the Ministry of Pensions, and as part-time referee to the Ministry of Health.

A. R. writes: Measham made friends wherever he went, and this was his secret of success as an administrator. He was able to gain the support and good will of all around him. But, as a doctor, it was his natural courtesy and affectionate concern for all sorts and conditions of people for which he will be remembered at home and abroad. He must have remembered Sir Patrick Manson's last speech at Manson House, when he pointed out to those who were destined to follow him how they should work. He ended with this verse from the poem, "The Invitation," by Kingsley:

> Do the work that's nearest
> Though its dull at whiles,
> Helping when you meet them
> Lame dogs over stiles.

Measham did just this.

He is survived by his widow, to whom we extend our sympathy.

A. G. VARIAN, M.A., M.D.

Dr. A. G. Varian died suddenly on June 8 at his home in Totnes, Devon. He was 70 years of age.

Amos George Varian was born in 1890. He received his medical training in Dublin, and graduated M.B., B.Ch., B.A.O. in 1914. He served as a captain in the R.A.M.C. during the first world war, returning to Dublin to proceed M.D. in 1919. After holding the post of house-surgeon at the Mercers Hospital, Dublin, he entered general practice, first in Hertfordshire and then in Totnes, Devon, where he settled in 1929. He was honorary secretary of the Hertfordshire Branch of the B.M.A. in 1929–30.

R. L. M. writes: Dr. Varian soon became established as a skilful and much-loved doctor. He took a keen interest in the welfare of the cottage hospital, on the committee of which he served for the past 20 years. He was divisional surgeon to the St. John Ambulance Brigade, and a medical referee for several insurance companies. Besides his professional interest Dr. Varian was a member of the British Legion and a leading Freemason. His genial personality endeared him to all who knew him and he will be sadly missed by his many friends. He leaves a widow and daughter, to whom we extend sincere sympathy in their tragic and sudden bereavement.

Medical Notes in Parliament

CLEANER BEACHES LEFT TO LOCAL EFFORT

[FROM OUR PARLIAMENTARY CORRESPONDENT]

The discussion on polluted beaches, in which the House of Commons was engaged on July 7, had a dual core—the report of the Public Health Laboratory Service research committee published last December,* and the locus of responsibility for action. The report was used both by the supporters and opponents of the current public outcry. Responsibility for cleansing action, where this is necessary, was left squarely on the shoulders of the local authorities.

Report Called "Pseudo-scientific Negativism"

The report itself was given a severe hammering by Dr. REGINALD BENNETT (Gosport and Fareham, Con.). To him it was nothing more than a piece of "pseudo-scientific negativism" on which the Minister of Housing and Local Government [Mr. Henry Brooke] was relying at his peril. The committee, he said, had committed a basic scientific error by standing pat on a negative; by asserting several times that they had not set out to prove certain things, and had not even carried out tests on them, and that therefore these things could not be proved to happen. That was dangerous advice, and the Minister was being led astray. Taking poliomyelitis as an example among water-borne diseases, he quoted the work of Paul and Trask, published in the *American Journal of Public Health* in 1942, on the sewage outfalls in the East River in Manhattan, in which they stated:

"From the sewage studies it appears that the virus may still be detected when considerable dilution has taken place, and we find that it may be transported by sewage for at least an eighth of a mile or perhaps for several miles."

Another worker had managed to isolate active polio virus from the sewer outfalls at Toronto. Rhodes and his co-workers had proved in a laboratory experiment in Canada in the early fifties that polio virus was recovered alive after 188 days in water.

Against this, the committee said they could not experiment with the coli group bacilli, but chose to experiment with the salmonella group as an analogous thing. They said they had every reason to have confidence. They did not establish this in that assertion. The committee claimed that sea disinfected. So it did. But under the heading "The fate of sewage organisms in sea-water" they stated (p. 18):

"A detailed study of such biological aspects of sea-water bacteriology in relation to sewage disposal has not been made in the present series of investigations."

In his opinion they gave away the whole argument by saying that. Again (on p. 22) the report stated:

"The committee has not yet been able to make a careful study of the effect of comminution or other modifications in sewage disposal on the bacterial quality of sea-water. . . ."

Pass Sold Twice

They had sold the pass twice, in the most blatant manner. The report ceased almost to have any value as a scientific document, although it testified to six years' hard work. How could these rather dull, cloudy asseverations, not based on experiments, be accepted against the facts proved by a few workers elsewhere? The public-health authority of the country laid down that a drinking-water supply which had more than one coliform bacillus in 100 c.c. was condemned outright; yet the same chaps were saying at Torquay "You can drink gallons of it with floating solids in it without the slightest risk." Then why test drinking water at all? That was all he wanted to know. It seemed to him that they were trying to put across two utterly different cases. In short, the report was just solemn poppycock.

He wanted the Minister to show willing to get something done—to encourage the building of sewage disposal plants; to encourage the building of plants making compost in conjunction with town refuse, on the Swiss model; and to support the principle of the "golden list," published by the Coastal Anti-Pollution League, which was based in his constituency. The Minister, he urged, should take a hint from public opinion, not a stand on bad advice.

Mr. MICHAEL STEWART (Fulham, Lab.), who opened the debate for the Opposition, regarded the work of this anti-pollution league as a valuable service, and suggested that the Government should consider themselves establishing a generally recognized standard for a decent and clean beach. One reason for the persistence of the disgraceful beach, he thought, had been the paralysis of judgment and action over the six years while the inquiry was in progress. He wanted the Government to adopt a programme of action including a nationally accepted standard for a decent beach; a quick inquiry into methods of treating sewage and siting outfalls; special loans for capital expenditure to put right local sewerage systems; and a revision of interest rate policy.

Efficient Discharge into Sea "Perfectly Satisfactory"

Sir KEITH JOSEPH, Parliamentary Secretary, Ministry of Housing and Local Government, claimed that discharge into the sea was a perfectly satisfactory method of sewage disposal provided it was efficiently carried out. Some outfalls, however, generally those built a long time ago, had been found to be badly sited, or overloaded, or fractured. Some coastal authorities were applying different degrees of treatment, but some resorts had not yet taken the necessary action to remedy the resultant pollution. He also quoted the report's specific conclusions on poliomyelitis—"bathing history is irrelevant to the causation"; enteric fever—"less than one case [each year on average] with a history pointing to a possible sea bathing infection"; and overall, that

"with the possible exception of a few aesthetically revolting beaches the risk to health of bathing in sewage-contaminated sea-water can, for all practical purposes, be ignored."

The explanation of the phrase "for all practical purposes" came in for some rough handling by subsequent speakers. It referred, he said, to the entirely theoretical risk that a bather might swallow sufficient water from an area in which sewage had been discharged to come to some harm. But it would have to be many gallons before there could be the least suspicion of a risk.

When a committee, which included 18 doctors among its 21 members, had been studying a subject for six years and had reached unanimous conclusions, they could not possibly disregard what it said. Everyone knew that there were beaches that were in a disgusting state; but everyone also knew that this was not the general picture. Most coastal resorts had already provided adequate sewage disposal at their own expense. Why should it necessarily be beyond the purse of those few who still needed to act? If there were cases where expensive work was necessary, help was already available through the rate deficiency grant. This remained a local authority task. There was no health risk against which the Minister must protect the public. The risk was quite different: it was the purely local one that if those few authorities whose beaches were seriously polluted did not act effectively they might well cease to attract holiday makers. "It is up to them [the local authorities] to see that their shop windows are not soiled."

Most of the subsequent speakers found this reply unsatisfactory, although three Conservatives from seaside

**Sewage Contamination of Bathing Beaches in England and Wales*, Medical Research Council Memorandum No. 37, 1959. H.M.S.O., London. Price 2s. 6d. net.

constituencies swam against the tide and deprecated exaggeration of a limited complaint. Mr. CLEDWYN HUGHES (Anglesey, Lab.) wound up for the Opposition with complete support for Dr. Bennett's strictures of the research committee's report, and condemned the Government's "indifference" as reprehensible.

Local Authorities Primarily Responsible

Mr. HENRY BROOKE, Minister of Housing and Local Government, endorsed the line taken by his Parliamentary Secretary in placing the prime responsibility on the local authorities. He rejected the idea of now offering subsidies to the laggards among them. He knew of one or two cases where an effective remedial scheme was being held up by local opponents who insisted on complete treatment of sewage. Until another group of doctors had made an equally scientific investigation he must accept the report of the research committee. He rejected as impractical the idea of a black list of local authorities; and denied that there was any backlog of sound schemes from local authorities held up in the Ministry.

An Opposition critical amendment was defeated by 206 votes to 156.

DATES FOR MENTAL HEALTH ACT

The MINISTER OF HEALTH announced in the Commons on July 11 that the Mental Health Act, 1959, would come into full effect on November 1. Sections 6–10, relating to local authority services and miscellaneous provisions; Section 4 (1), relating to the use of new terms; Section 3 in the first schedule, relating to the appointment of Mental Health Review Tribunals; and Section 144, relating to fees and expenses, are, however, to come into operation forthwith.

QUESTIONS IN THE COMMONS

Colonial Medical Service

Dr. BARNET STROSS, in a question to the Colonial Secretary on July 7 about the need for expansion of the Colonial Medical Service, suggested that it should be integrated with the National Health Service. Mr. IAN MACLEOD answered that he was aware of the need for a steady increase in the numbers of doctors available for service in the dependent territories. His department had had a fair measure of success in recruiting doctors to meet requests made by Governments. The large territories in East Africa were increasingly using local doctors qualified at the Medical school of Makerere. Arrangements were already in force for doctors in the National Health Service to serve overseas while preserving their pension rights here, and in cases where the home employers were able to keep a post open while a doctor was serving abroad secondment was arranged.

Dr. STROSS commented that in the last part of his answer Mr. Macleod had touched on the difficulty. Integration would make it easier for men to do a term of service abroad without losing their chance of promotion at home. Mr. MACLEOD said he did not believe that integration in that sense was possible or practicable, because there were so many employers of doctors here and abroad. They were in consultation with the B.M.A., and would continue the consultations to ascertain what arrangements they could make on the lines of his first answer.

Mr. BRIAN HARRISON (Maldon, Con.) asked him to make certain that there was an adequate number of non-medical people in the administrative services, so that there was no repetition of the farcical situation that happened in an Aden hospital where the doctors were doing all the administrative work and wasting their special skill. Mr. MACLEOD agreed that that was important. There were 50-odd vacancies for doctors, he said, and a number of these which were for specialist posts were rather difficult to fill.

Polio Vaccination of Adults

The MINISTER OF HEALTH informed Mr. PHILIP HOLLAND (Acton, Con.) on July 4 that 242,905 people aged between 26 and 40 years had applied for vaccination against poliomyelitis by March 31. This figure related only to the first two months of the extended scheme. A better indication should be given in the figures for June 30, which would be available before the end of this month. Mr. HOLLAND thought the number was a small percentage of the total in the age group. He asked the Minister to emphasize that expectant mothers were particularly vulnerable to poliomyelitis and should take the earliest opportunity to obtain the protection of vaccination. Mr. D. WALKER-SMITH said he would certainly do so.

Dr. EDITH SUMMERSKILL (Warrington, Lab.) called the figures disappointing, and repeated her suggestion that facilities at clinics should be made available to workers during lunch hours. It was difficult for people to go to their doctors at night. Some were reluctant to do so for all kinds of reasons. She hoped the Minister would be more positive in his attitude. Mr. WALKER-SMITH told her he had not lost sight of the suggestion. It was too early to say the figures were disappointing. Some local health authorities had not got their arrangements going by March 31. They would have better figures presently, but they should not expect in this age group figures of the sort that had been achieved among younger people.

Assistants' Share of Pilkington Increase

Mr. L. PAVITT (Willesden, West, Lab.) asked the Minister on July 4, if, when he made any retrospective payment to general practitioners in accordance with the recommendations in the Pilkington Report, he would ensure that assistants would receive retrospective increases proportionate to the sums received by their principals. Mr. WALKER-SMITH replied that he had explained on June 20, that the conditions of employment of assistants were a matter for private contract between each principal and assistant, and no information was available centrally from which recent average salaries could be calculated. He understood that the representatives of the medical profession had the interests of assistants well in mind.

Mr. PAVITT said the Minister was absolving himself from responsibility by throwing this back to the medical profession. Local executive councils had an account of the net salaries paid to assistants for superannuation purposes. Could he not keep himself informed by taking a sample? Mr. WALKER-SMITH replied that he was prepared to look into the executive councils' statistics to see whether they would help, but he repeated that these arrangements were the subject of private contract. He was pleased with the assurances given by the chairman of the General Medical Services Committee that doctors would do the right thing by their assistants. Mr. PAVITT said that the Pilkington recommendations would mean a great increase in salary for the principal during the time of the contract. Would not the Minister ensure that a proportion was passed on to the assistant? Mr. WALKER-SMITH: "The distribution will be agreed with the medical profession, and the profession has said it will do the right thing by its assistants." Part of the Pilkington Commission's recommendations was that this system should continue on the basis of settlement by private agreement between the doctor and the assistant.

Leucotomy Report Expected

Mr. J. B. HYND (Sheffield, Attercliffe, Lab.) asked the Minister, whether he could announce the results of the investigations undertaken by his department into the after-effects of the pre-frontal leucotomy operation on those persons who had been subjected to such operation. Mr. WALKER-SMITH stated that the results of the inquiry could not yet be announced; but the necessary statistical analyses had now been made and a report was being prepared.

Medico-Legal

RADIONICS AND THE BLACK BOX: COUNSELS' FINAL SPEECHES

[FROM A LEGAL CORRESPONDENT]

On July 6 Mr. Justice Davies reserved judgment in this action by Miss Catherine Olivia Philips, of Four Winds, Porlock, Somerset, against Mr. George Walter de la Warr, of Raleigh Park Road, Oxford, for damages for fraud. We reported the earlier stages of the action last week (July 9, p. 156). The judgment will be summarized when it becomes available.

Mr. David Karmel, Q.C., and Mr. D. R. Stukey appeared for Miss Philips; Mr. Christmas Humphreys, Q.C., Mr. R. J. Trott, and Miss R. Denfield for Mr. de la Warr.

"Box Depended on Her Thought Resonance"

Mr. Humphreys, making his final speech for the defendant, said that the issues between the plaintiff and the defendant were whether it was proved that there was no such thing as radionics, whether the instrument was incapable of being used for diagnosis, whether the plaintiff or anyone else had the ability to use it, and whether the tests and the lesson given to the plaintiff were genuine. He asked his Lordship to say that the instrument was capable of diagnosing radiations and of using them in some way for treatment, and that Miss Philips passed a genuine test and had such genuine lessons as she was prepared to take. The way in which the box worked did not have to be proved. Miss Philips had known all along that the machine was said to work by radiaesthesia, and she knew that a great deal of skill was required from the operator. The box depended on her thought resonance, and she had read that radionic diagnosis must not be confused with medical diagnosis.

His Lordship said that, whatever else radionics might be, he was satisfied that it was not, as one witness said, an exact science. Although the radionic camera was to some extent incidental in the case it was no good shutting one's eyes to the fact that the camera was one of the high-spots of radionic literature. Mr. Karmel had asked: "How could Mr. de la Warr honestly believe in the box if the camera was a fake?" In those circumstances, although it might be that his Lordship had not got to decide if the box were a fake, he would have to decide if the camera were.

Counsel said that it was admitted that the camera was erratic, and that they had not proved anything repeatable. Nobody knew how it worked. One explanation was that it was possible that there was a counterpart energy pattern to each organ in the body, which bore some resemblance to the shape of that organ, and that it was this that was photographed. The Court had heard the evidence of Dr. Watson, who saw an image produced on a plate in just the same way, and the evidence of Mr. Kenneth Walker, who did not find the claim fantastic or ridiculous.

Circles Round Orthodox Medicine

Counsel said that around the sphere of orthodox medicine there were many concentric circles; there was psychology, which had only in this century achieved recognition; there was homoeopathy, which, was practised by many doctors; and there were osteopaths. Now there was this new field of mental force. Pioneers were always laughed at; later they might be accepted and even canonized. They were dealing with a new field of thought. The de la Warrs said that it worked, although they did not know how. It had been said that 30 years ago we thought that we were heading towards a mechanical reality; but now the world was beginning to look like a great thought. We knew now that space was in the melting-pot; Hoyle, Einstein, and W. J. Dunne had said as much; as to time, Mr. Kenneth Walker had said that he was about to publish a book about precognition; as to the mind itself, we knew about telepathy from Dr. Rhine; hypnotism, where the mind of one person affected the mind of another, was now in common use in medical practice. There were also well-known forms of mental healing, and evidence had been given of the effect of inimical thoughts; some people believed in the positive effects of blessings. How did it work? We did not know. We knew that thought was of the highest importance. We also knew that it was more akin to extra-sensory perception than anything else. The defendant had invited inquiry and tests; he published the snubs. It was impossible to believe that he had organized and maintained the longest and largest criminal hoax in the history of medicine.

"At Best an Illusion"

Mr. Karmel, in his final speech for Miss Philips, said that this box and everything that went with it was at best an illusion, and at worst a colossal fraud. Miss Philips was led to believe that this box would enable her to diagnose and treat people and animals on the physical plane on which we were now standing. On the eighth day of this action it was made clear that the de la Warrs did not claim to cure anything physical, or to treat anything physical; the box was intended for mental treatment on a pre-physical level. It was a clear fraud to tell her that she had the ability to operate this box, and the defendant had no reasonable grounds on which to base this after giving her only a perfunctory test. Miss Philips was given to understand that cancer, tuberculosis, and thrombosis could be cured. Mr. de la Warr now admitted that it would be more honest to say that this referred to some pre-physical treatment of a pre-physical condition somewhere up in the skies. The whole set-up was sham, like the rate book. That book had grown out of Mr. de la Warr's having a look through *Gray's Anatomy*. Like all successful frauds, this one had been very well planned, and it had particular appeal to neurotics, hypochondriacs, and religious people—a very fruitful field. Test after test had been suggested and there had been one ludicrous excuse after another. The defendant's tests were always intangible; everything was always put off or qualified or had to wait.

Counsel now desired to pass on to this theory that every substance, every particle in the world, had its own particular rate of radiation. Dr. Camps had said that there was no possible foundation for this theory, and that a blood spot sent through the post on a piece of paper in this way would deteriorate and become useless. But, when pressed, the de la Warrs said that the blood spot did not matter—any blood would do—treat the tiger with the blood of an elephant, treat the man for arthritis using the blood of a woman with diseased ovaries; but if you happen to change the blood, there might be an adverse reaction, whatever the patient might be doing, playing golf or addressing the Court.

Seven Doctors

He would take the seven doctors and Sir Victor Goddard and the Reverend Leslie Weatherhead together. All these witnesses had something in common—they lived and thought in a somewhat rare atmosphere. They were all interested in spiritualism or faith healing. They were no longer in practice except for Mr. Walker, and he was writing a book on precognition. They had come into the witness box because they had been persuaded that there was something worth investigating; so indeed had the witnesses for the plaintiff. But the defendant's witnesses had not attempted to get any tests done. Where was a patient without a box who could say, "I was suffering from a disease, and I was cured"? Where was the evidence that this box had treated an organic disease successfully? It was now clear that the only claim that could be made about this machine was in the mental field. It was a form of faith healing, like going to a good friend and talking things over. If so, the box had nothing to do with it.

His Lordship.—What is so odd is that this diagnostic instrument can cure only on the pre-physical plane, and yet all the time they say it does affect the physical plane.

Animals which ate the treated food were fatter; if that isn't physical, I don't know what is. So the net product is physical.

Camera the Legal Touchstone

In conclusion, counsel said that, whatever else had been proved, it had been proved beyond a shadow of doubt, by criminal standards, that the camera and the images it was said to produce were fakes. And if his Lordship so found there could be no doubt that the defendant counselled or procured it, or at the very least aided and abetted it. If that was so, it was impossible to get away from the position that the defendant had no honest belief in the box.

His Lordship.—I agree. If you satisfy me that the camera is a fraud, and that the defendant knew that it was a fraud, then he goes down on the box too. That must be so.

His Lordship reserved his judgment and the hearing was adjourned.

CORONERS' CASES

Accidental Arsenical Poisoning

The death of a young woman occurred recently in very unusual circumstances after treatment at the Chelsea Hospital. Mrs. Dorina Scott, aged 28, had a long history of vaginal discharge. For the past two years she had used "S.V.C." pessaries, which contained acetarsol 4 gr. (0.26 g.), inserting one daily into the vaginal vault in the usual manner. Her treatment had been rather sporadic. She had never experienced any symptoms suggestive of hypersensitivity to acetarsol, and there was no history of allergy. The vaginal discharge persisted despite these measures and it was therefore decided to admit Mrs. Scott for a course of intensive treatment. Under an anaesthetic 18 S.V.C. pessaries (acetarsol gr. 72—4.68 g.) were inserted into the vagina. After this operation there was a good deal of vomiting but gradually she fully recovered; two days later 12 more pessaries (48 gr.—3.2 g.) were inserted, again under general anaesthesia. Following this the patient's condition gave rise to alarm. There was profuse vomiting, convulsions, and anuria. She became semi-comatose and it was obvious that a condition of grave emergency had developed. She was transferred to another hospital, where she received treatment with B.A.L. (dimercaprol). Efforts to resuscitate her were unsuccessful and she died the same day.

At the inquest evidence was given that death was due to acute arsenical poisoning. Dr. D. A. L. Bowen, the pathologist, told the coroner that he had not been able to find any account in the literature of a similar case. Dr. Gavin Thurston, the Hammersmith coroner, remarked that from this single case it was now known that a treatment that was thought safe was potentially dangerous. He recorded a verdict of accidental death (*The Times*, May 5).

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

In Congregation on June 11 the following degrees were conferred:

M.D.—H. B. Eckstein, R. W. Payne, C. W. M. Adams, P. J. Dawson.
M.B., B.CHIR.—*By proxy*: G. Willett.
M.B.—D. R. F. Clark, R. B. Church.

UNIVERSITY OF WALES

WELSH NATIONAL SCHOOL OF MEDICINE

The following candidates have satisfied the examiners at the examination indicated:

DIPLOMA IN PUBLIC HEALTH.—D. J. W. Anderson (with distinction), J. N. Bodger, J. L. Davies, D. C. Dymond, C. E. Edwards, T. L. Jones, P. Lavis, P. C. Moore, I. D. G. Richards, Enid C. Vincent.

The following candidates have satisfied the examiners at the examination indicated:

DIPLOMA IN TUBERCULOSIS AND CHEST DISEASES.—S. Z. Ahmad, B. N. Bapat, S. B. Barua, T. Chakorn, C. Chin Hin Chew, D. N. Gupta, A. Khaliq, P. Macpherson (with distinction), M. H. Maung, G. D. Murphy, H. A. Narain, B. Ponniah, V. C. Ratnesar, J. A. Siddiqui, I. Taha.

UNIVERSITY OF BRISTOL

The following candidates have been approved at the examinations indicated:

M.D.—D. H. Bowden, W. K. Metcalf.
PH.D.—*In the Faculty of Medicine*: Dinah C. Payne.

UNIVERSITY OF LIVERPOOL

At a meeting of the University Council held on June 21 the following were appointed senior lecturers in the subjects indicated in parentheses: Dr. I. C. Geddes (Anaesthesia); Dr. T. G. Richards (Physiology); and Dr. J. S. Scott (Obstetrics and Gynaecology).

ROYAL COLLEGE OF SURGEONS IN IRELAND

At a meeting of the College held on June 7 the following were elected for the ensuing year: *President*, T. G. Wilson; *vice-president*, N. A. Kinnear; *council*, R. Atkinson Stoney, J. F. Devane, A. A. McConnell, T. O. Graham, A. B. Clery, Ian Fraser, T. Millin, M. P. Burke, R. R. Woods, E. N. MacDermott, J. H. Coolican, D. J. Riordan, J. G. Mathews, J. P. Lanigan, F. A. J. M. Duff, D. Montgomery, S. T. McCollum, J. M. McAuliffe Curtin, E. O'Malley.

The Fellowship of the College was conferred on the following candidates on June 16: M. T. D. Braide, J. F. Doyle, P. B. Kiely, H. Abd-el-Maksoud Mostafa, R. W. Pigott.

Vital Statistics

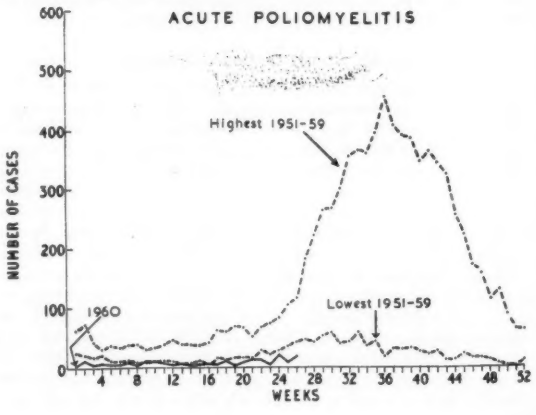
Scotland in First Quarter

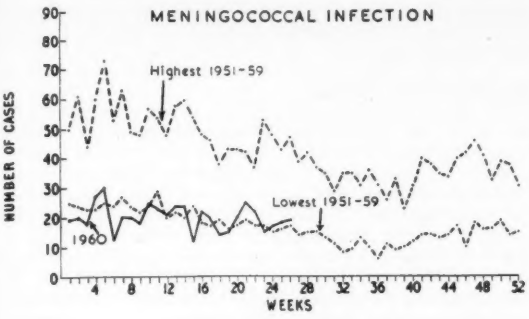
The birth rate in Scotland for the first quarter of 1960 was 19.5 per 1,000 population and was 0.4 lower than the rate for the corresponding quarter of 1959. The infant mortality rate was 29 and the neonatal rate was 19 per 1,000 live births; these rates were 4 and 3, respectively, below the rate for the preceding first quarter. Stillbirths were 24 per 1,000 total births. The death rate was 13.3 per 1,000 population and was 3.2 below the rate for the preceding first quarter.

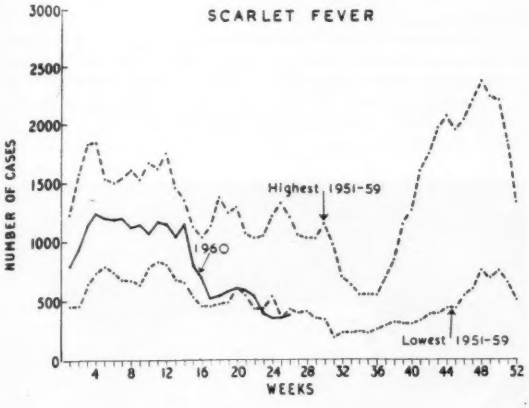
The number of deaths from the principal epidemic diseases was 42. These included 9 from meningococcal infections, 2 from whooping-cough, and only 31 from influenza (510 in 1959). Deaths from tuberculosis numbered 159 from respiratory and 9 from other forms, and were 62 and 6 fewer than in the first quarter of 1959. Deaths from violence totalled 754; 308 were due to accidents in the home and 175 to transport accidents.

Graphs of Infectious Diseases

The graphs below show the uncorrected numbers of cases of certain diseases notified weekly in England and Wales. Highest and lowest figures reported in each week during the years 1951–9 are shown thus ------, the figures for 1960 thus ———. Except for the curves showing notifications in 1960, the graphs were prepared at the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine.







Infectious Diseases

Areas where numbers of notifications were high in the latest two weeks for which figures are available.

	Week Ending June 25	Week Ending July 2
Dysentery		
Essex	34	**43**
Romford M.B.	3	**18**
Hampshire	32	**28**
Hartley Wintney R.D.	0	**10**
Lancashire	173	**146**
Liverpool C.B.	25	**30**
Manchester C.B.	50	**28**
London	106	**87**
Lewisham	9	**22**
Middlesex	32	**33**
Ealing M.B.	7	**9**
Yorkshire West Riding	76	**74**
Leeds C.B.	21	**28**
Glasgow	127	**126**
Paratyphoid Fever		
Middlesex	1	**2**
Tottenham M.B.	0	**1**
Twickenham M.B.	1	**1**
Food Poisoning		
Durham	4	**14**
Sunderland C.B.	0	**12**
Essex	9	**16**
Lancashire	52	**42**
Liverpool C.B.	11	**15**
London	25	**34**
Chelsea	1	**9**

INFECTIOUS DISEASES AND VITAL STATISTICS

Summary for British Isles for week ending **June 25** (No. 25) and corresponding week 1959.

Figures of *cases* are for the countries shown and London administrative county. Figures of *deaths* and *births* are for the whole of England and Wales (London included), London administrative county, the 17 principal towns in Scotland, the 10 principal towns in Northern Ireland, and the 14 principal towns in Eire.

A blank space denotes disease not notifiable or no return available.

The table is based on information supplied by the Registrars-General of England and Wales, Scotland, N. Ireland, and Eire, the Ministry of Health and Local Government of N. Ireland, and the Department of Health of Eire.

CASES	1960 Eng. & Wales	1960 Lond.	1960 Scot.	1960 N. Ire.	1960 Eire	1959 Eng. & Wales	1959 Lond.	1959 Scot.	1959 N. Ire.	1959 Eire
Diphtheria	3	1	0	0	1	15	12	3	0	
Dysentery	800	106	215	9	1	791	78	241	5	6
Encephalitis, acute	2	0	0	0		3	0	0	0	
Enteric fever:										
Typhoid	2	0	0	0		4	2	0	0	
Paratyphoid	5	1	0	0		4	1	0	0	10(a)
Food-poisoning	265	25	21	5		259	49	22	2	
Infective enteritis or diarrhoea under 2 years				18	21				6	26
Measles*	2,465	134	28	4	1	11,105	404	251	212	192
Meningococcal infection	18	1	15	1		21	2	8	0	
Ophthalmia neonatorum	15	1	4	0		19	3		0	
Pneumonia†	173	10	140	5	1	209	6	131	1	
Poliomyelitis, acute:										
Paralytic	7	0	0	} 0	7	27	7	0	} 0	
Non-paralytic	2	0	0			15	1	3		
Puerperal fever§	152	31	13	0		200	27	12	1	
Scarlet fever	365	16	40	14	27	818	54	67	15	
Tuberculosis:										
Respiratory	426	49	73	17		513	65	81	10	
Non-respiratory	43	4	7	6		63	4	13	2	
Whooping-cough	1,561	123	148	2	29	722	25	88	25	53

DEATHS	1960 Eng. & Wales	1960 Lond.	1960 Scot.	1960 N. Ire.	1960 Eire	1959 Eng. & Wales	1959 Lond.	1959 Scot.	1959 N. Ire.	1959 Eire
Diphtheria	0	0	0		0	0	0	0	0	0
Dysentery	2	0				2	1		0	
Encephalitis, acute		0			0		0			0
Enteric fever	0	0	0			0	0	0	0	
Infective enteritis or diarrhoea under 2 years	2	1	1		0	3	0	2	0	1
Influenza	5	0	0		0	6	0	0	0	0
Measles		0	0		0		0	0	0	0
Meningococcal infection		0	0				0	0		
Pneumonia	412	21	15		5	322	24	11	17	0
Poliomyelitis, acute	1	0			0	0	0		0	0
Scarlet fever		0	0		0		0	0	0	0
Tuberculosis:										
Respiratory	} 57	4	3		3	} 52	1	8	1	6
Non-respiratory		0	1		0		2	0	0	0
Whooping-cough	2	0	0		0	0	0	0	0	0
Deaths 0–1 year	293	31	37		9	296	36	25	8	13
Deaths (excluding stillbirths)	8,643	710	514		163	8,427	655	493	121	145
LIVE BIRTHS	15,396	1325	1088		438	14,608	1263	1088	274	365
STILLBIRTHS	292	24	19			300	29	23		

* Measles not notifiable in Scotland, whence returns are approximate.
† Includes primary and influenzal pneumonia.
§ Includes puerperal pyrexia.

Medical News

Altnagelvin Hospital Opened

Altnagelvin Hospital, Londonderry, was officially opened on July 5 by H.E. the Lord WAKEHURST, Governor of Northern Ireland.

Photographs of Altnagelvin—which means the height or hillside of the sparrows—and descriptions of it have already appeared in the *Journal* of December 19, 1959, p. 1417, and in this year's March 19 issue on p. 874. A large boulder excavated from the site was used for the foundation stone. It was found to be a boulder of Barnesmore granite which had been carried about 35 miles to the site from the Barnesmore Gap by the ice of the Ice Age.

Opening of Surgical Neurology Department, Edinburgh

The new department of surgical neurology at Western General Hospital, Edinburgh—described with photographs in the *Journal*, May 21, p. 1581—was officially opened on July 1 by the Right Hon. J. S. MACLAY, Secretary of State for Scotland.

Surgical neurology as a specialty started in Edinburgh in 1925 in Ward 20 of the Royal Infirmary. More beds were made available during the war at Bangour Hospital, and after the war—when it was found that about 80 neurological beds were needed for the South-east Scotland population of one million—the new department in the Western General was planned. It can now take 60 patients other than injury cases. Head and spinal cord injuries will continue to be treated in the 22 beds at the Royal Infirmary. Professor NORMAN DOTT will be in charge of the new unit, which is designed to cope with some 1,000 patients a year, each staying about three-and-a-half weeks.

Break-up of Families

In the autumn of 1955 a joint committee of the Bristol Division of the British Medical Association and the Bristol Local Medical Committee was set up, under the chairmanship of Professor A. V. NEALE, to consider the problem of preventing families from breaking up under the stress of such factors as misfortune, parental tension or irresponsibility, or the presence in the family group of psychopathic personalities. The committee, which bore the role of the general practitioner particularly in mind, has now issued its report, and it considers that though *Prevention of Break-up of Families* refers primarily to Bristol the principles on which it is based are of more than local interest to doctors and social workers. Copies may be obtained from the Bristol Local Medical Committee, 7, The Dell, Westbury-on-Trym, Bristol, at 5s. each or 5s. 6d. by post.

B.M.A. Film Competition, 1960

For the purpose of encouraging the production of good medical films, the Council of the British Medical Association offers medals and certificates for 16-mm. medical films, completed within the two years before September 30, 1960, to be submitted in open competition. Awards will be considered in two categories—for commercial and non-commercial film producers. Further details and entry forms are obtainable from the Secretary, B.M.A. House, Tavistock Square, London, W.C.1. Entry forms must be returned by September 30, and films sent in by November 15.

Disabled Living Research Unit

It is hoped that the Disabled Living Research Unit, the Mary Marlborough Lodge, built by the National Fund for Research into Poliomyelitis and other Crippling Diseases in the grounds of the Nuffield Orthopaedic Centre, Oxford, and briefly described with a photograph in the *Journal*, October 31, p. 895, will be opened towards the end of this month. It will be directed by Professor J. TRUETA, Nuffield professor of orthopaedic surgery. The purpose is to study and advise on the problems of daily living encountered by the severely disabled patient at home, and there will be 12 National Health Service beds without Regional restriction for patients and the relatives who may need to accompany them, as well as a workshop for designing and fitting special aids. Inquiries should be addressed to Dr. MARGARET AGERHOLM or the Warden, Miss WANDA WILLIAMS, Mary Marlborough Lodge Nuffield Orthopaedic Centre, Oxford. (Tel. Oxford 64811.)

Housing for the Disabled

The St. Giles Housing Society, a new charitable Housing Society for the disabled, has just been formed in the London area. The Society, which is sponsored jointly by the Central Council for the Care of Cripples and the National Federation of Housing Societies, plans to convert large older houses to single and double flatlets suitably equipped for the disabled, bearing particularly in mind those who have to use wheel-chairs. Further information can be obtained from the Honorary Secretary, Miss M. E. MERRYLEES, St. Giles Housing Association Limited, 12, Suffolk Street, Pall Mall East, London S.W.1. (WHI 1693/4.)

Kariba Hospital

A new township for 10,000 people was built in 15 months to house the workers on the Kariba hydro-electric scheme in Rhodesia, and it includes a hospital with 90 beds—13 for Europeans and 77 for Africans—equipped with an operating block, a radiography department, and a laboratory. The three medical officers and seven nursing sisters

[*Richard Costain, Ltd.*

An aerial view of Kariba Hospital.

are European, and there are 12 African nursing orderlies. The malaria and tse-tse fly control officer attached to the hospital has an African labour force of 16.

Since the hospital opened on April 1, 1957, to the first half of 1960 it has treated over 77,000 out-patients and 9,000 in-patients; influenza, bronchitis, and pneumonia being the chief diseases. Many African children have suffered from gastro-enteritis, and a great number of Africans, mainly those coming into the area from Nyasaland and Portuguese East Africa, have been treated for bilharzia and hookworm.

Royal Society

Among the awards made under the Royal Society and Nuffield Foundation Commonwealth Bursaries scheme is one to Dr. H. MCLENNAN, associate professor of physiology, University of British Columbia, to enable him to extend to invertebrate material his studies on the chromatographic characteristics of an inhibitory principle present in mammalian brain, at University College London, in June and July. The Royal Society has appointed Dr. J. SEED, department of radiotherapeutics, University of Cambridge, to a Foulerton Gift Research Fellowship from October 1 to enable him to carry out an investigation of the control mechanisms of nucleic acid and protein synthesis in normal and tumour cells, with particular reference to the actions of ionizing radiations in radiotherapy.

Harveian Society and Hempstead Parish Church

Hempstead Parish Church, where WILLIAM HARVEY lies, has been in a state of neglect since the tower fell down in 1883, and efforts to restore it have failed for lack of funds. The Harveian Society of London has now undertaken the task and a service of dedication was recently held to consecrate the work of rebuilding the tower and restoring the churchyard. The treasurer of the Harveian Society

(11, Chandos Street, Cavendish Square, London, W.1) would still welcome donations, and the voluntary clerk-of-works, Colonel G. A. SMITH, who lives at Chase Side Cottage near the church, would be pleased to show visitors how the work progresses.

British Association of Urological Surgeons

At the annual meeting of the British Association of Urological Surgeons held in London on June 23, 24, and 25, under the Presidency of Mr. DAVID BAND, the main discussion of the scientific programme was on "Calculous Disease in the Upper Urinary Tract." The papers will be published in the *British Journal of Urology*. The following were elected officers and members of council for 1960–1:

President, Mr. DAVID BAND; *immediate past president*, Mr. ARTHUR JACOBS; *vice-president*, Professor L. N. PYRAH; *honorary treasurer*, Mr. R. A. MOGG; *honorary secretary*, Mr. D. INNES WILLIAMS; *honorary editorial secretary*, Mr. N. M. MATHESON; *members of council*, Mr. G. H. BAINES, Mr. J. P. MITCHELL, Mr. T. MOORE, Mr. B. H. PAGE, Mr. F. P. RAPER, Mr. N. L. SHEPPERD, Mr. W. BARR STIRLING, Mr. D. M. WALLACE, Mr. W. K. YEATES; and, *ex officio*, the president of the section of urology, Royal Society of Medicine, and the chairman of the editorial committee, *British Journal of Urology*.

Central Midwives Board

Changes in the rules of the Central Midwives Board came into effect on July 1. A new edition of the handbook containing the rules may be obtained from Messrs. Spottiswoode, Ballantyne and Co., Ltd., 1, New Street Square, London, E.C.4.

Approved Names of Drugs

The General Medical Council has published a pamphlet giving the approved names chosen by the British Pharmacopoeia Commission for recently introduced drugs. The list gives the approved names issued since 1948, together with some issued earlier for substances which have not become the subject of official monographs in the *British Pharmacopoeia*. Copies may be obtained on application to the G.M.C., 44, Hallam Street, London, W.1.

Leprosy Research Fund

A photographic exhibition demonstrating the clinical and histopathological evolution of leprosy against the background of the world pattern of the disease was held at the Fund's headquarters on July 5.

During the exhibition the Fund's Secretary, Dr. R. G. COCHRANE, said that it was hoped that the exhibition—which includes a very considerable number of colour and black-and-white clinical photographs and a range of coloured photomicrographs of skin sections of the various types of leprosy, as well as nearly 4,000 slides of biopsy specimens—would become the basis of a register of histopathology and an information and teaching centre for leprologists in Great Britain and for post-graduate students from overseas. He concluded by saying that, unless £5,000 a year could be made available or a permanent home for the registry be found, the collection would have to be dispersed after June 30 next year. The address of the Leprosy Research Fund is 11a, Weymouth Street, London, W.1.

Hospital Service Plan Scheme

A booklet describing the Hospital Service Plan Scheme for B.M.A. members will be sent to every member of the B.M.A. in the United Kingdom during the next three weeks.

"Thyroidologists" Confer

A dinner in honour of the Fourth International Goitre Conference was held in the Mansion House on July 7. Sir CHARLES HARINGTON, F.R.S., who presided, proposed the toast, "The Lord Mayor, the Corporation of London, and the Sheriffs," to which Sir EDMUND STOCKDALE, the Lord Mayor of London, replied. The toast of the Conference was proposed by Sir ROBERT PLATT, P.R.C.P., and responded to by Dr. HOWARD MAHORNER, president of the American Goiter Association. Dr. RAYMOND GREENE (introducing the word "thyroidologist") proposed the health of overseas visitors, and Dr. A. W. SPENCE of the guests: Professor JEAN ROCHE and Sir JAMES PATERSON ROSS replied.

In Brief . . .

WILLIAM WITHERING'S Edinburgh graduation diploma and a letter written by him in 1799 have been given to the University of Edinburgh.

"The average child leaving school in British Columbia," says the *Public Health Services of British Columbia Annual Report for 1959*, "has, of his or her 28 permanent teeth, already 12 teeth which are decayed, missing or filled."

People in the News

Dr. HERBERT KRAUS, the Yugoslav Minister of Health, and Professor GRUJICA ZARKOVIC, director of the Institute of Hygiene and Preventive Medicine, University of Sarajevo, are spending a fortnight in Britain as official guests of the British Government to gain an insight into the working of the National Health Service.

COMING EVENTS

British Academy of Forensic Sciences.—First scientific and general meeting: the New Hall, the London Hospital Medical College, July 22–3. President: Professor LEON RADZINOWICZ; subjects for discussion: "Education and Training," "Research and Investigation," and "Evidence and Witnesses." The meeting is open to interested persons on application to the Secretary, 37, Welbeck Street, London, W.1.

Society for Endocrinology.—Annual lecture: Professor BERNARDO A. HOUSSAY (Buenos Aires), "An Argentine Trail in Hypophyseal Research," July 27, 5.15 p.m., Royal Society of Tropical Medicine and Hygiene, Manson House, 26, Portland Place, London, W.1. Admission free.

Institute of Diseases of Chest.—Clinical demonstrations, open to medical practitioners without fee, will be continued in lecture room of Institute (Brompton Hospital grounds, Fulham Road, London, S.W.3) on Fridays at 5 p.m. during August and September.

4th International Congress on Clinical Chemistry.—Edinburgh, August 14–19. Symposia will include "Plasma Protein Turnover in Disease," "The Mechanisms of Urine Production," "Congenital Abnormalities of Metabolism," and "Enzymes in Clinical Chemistry." Details from Dr. S. C. FRAZER, Royal Infirmary, Edinburgh, 3, Scotland.

SOCIETIES AND LECTURES

A fee is charged or a ticket is required for attending lectures marked ●. Application should be made first to the institution concerned.

Monday, July 18

ROYAL FREE HOSPITAL, Gray's Inn Road, W.C.—5.15 p.m., Sir Macfarlane Burnet, O.M., F.R.S. (Melbourne): Auto-immune Disease.

Tuesday, July 19

METROPOLITAN EAR, NOSE, AND THROAT HOSPITAL.—At Nurses' Lecture-room, Training School, St. Mary Abbots Hospital, Marloes Road, Kensington, W., 5.30 p.m., Dr. James Arnhoff (Mount Sinai Hospital, New York): Psychosomatic Ear, Nose, and Throat Problems.

Friday, July 22

ROYAL COLLEGE OF SURGEONS OF EDINBURGH.—3.30 p.m., Mr. R. S. Handley: Observations and Reflections on Breast Cancer.

Saturday, July 23

CAMBRIDGE UNIVERSITY MEDICAL SCHOOL.—At Lecture Room "B," Addenbrooke's Hospital, Psychiatric Symposium on the Family. *Morning:* 10.30 a.m., Dr. B. B. Zeitlyn: The Family as a Unit; 11.30 a.m., Dr. R. E. Glennie: The Child in the Family; 12.15 p.m., Dr. Brian Davy: The Adolescent in the Family. *Afternoon:* 2.30 p.m., Dr. O. E. F. Hodgson and Miss J. Ferguson, M.A.: The Problem Family; 3.45 p.m., Dr. E. Beresford Davies: Decline and Bereavement in the Family; 4.30 p.m., Questions and discussion.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Alexander.—On June 25, 1960, at Sheffield, Yorks, to Lilias (Dr. Susan Munro), wife of Dr. Conel Alexander, a son.

Cantor.—On July 6, 1960, at Kent and Canterbury Hospital, to Kathleen (formerly Wallach), wife of Dr. J. Cantor, a sister for Timothy and Christopher.

McCallum.—On July 8, 1960, at Nottingham, to Dr. and Mrs. D. I. McCallum (formerly Dr. Isabel S. Smellie), a daughter.

Trumper.—On July 3, 1960, at Beaverlodge, Alberta, Canada, to Gillian, wife of Dr. M. B. Trumper, a son.

Warwick-Brown.—On July 4, 1960, at Sandleford Hospital, Newbury, Berks, to Jean (formerly FitzHerbert-Auckland), wife of Dr. R. Warwick-Brown, a sister for Nigel and Janet—Caroline Sarah.

Any Questions?

We publish below a selection of those questions and answers which seem of general interest. It is regretted that it is not possible to supply answers to all questions submitted.

Polio Vaccination for Immigrant Children

Q.—*Recent correspondents (February 20, p. 570, and March 26, p. 957) have strongly emphasized the necessity for efficient inoculation against poliomyelitis for all young Europeans visiting Asia and Africa. I should like to know about the necessity of poliomyelitis vaccination for persons coming to this country from the tropical countries.*

A.—Persons coming to the United Kingdom from tropical countries should be advised to be vaccinated against poliomyelitis. This is a precautionary measure. The polio virus is very prevalent in most tropical countries and it has been found that the majority of children over the age of 5 years have antibodies in their blood (evidence of previous infection and relative immunity). But the polio virus is also present in this country, and unprotected persons arriving from abroad, especially in the summer and autumn months, run some risk of infection.

T.A.B. Inoculation Before Travel in France

Q.—*Is it necessary nowadays for adults and children to have a course of T.A.B. vaccine before going to the south of France?*

A.—It is not necessary for travellers anywhere to have a certificate of vaccination with T.A.B.—that is, it is not compulsory. But in many parts of the world it is advisable. The south of France is not one of these parts, provided that the travellers expect to reside in reasonably good hotels, but if they intend to camp out, hike through villages, or in any way "rough it" in places off the beaten track (where plumbing is primitive or non-existent), then it would be advisable for adults and children to have the protection of a course of T.A.B. Children often need this measure more than adults.

It must, however, be remembered that the protection afforded by the vaccine is not absolute: enteric infections do occur among the inoculated. Unnecessary risks should not be run with food and drink, and swimming in streams and lakes in areas where the standard of sanitation is low may be dangerous. Nevertheless, inoculation and reinoculation are worth while and materially reduce the risks. To get the maximum benefit from the vaccine the course should be complete and properly timed. This requires forethought and planning: the interval between the first and second doses is all too often as short as a week, but should be four weeks, and a third dose 6–12 months later, although often omitted, should ideally be given to complete the primary course of immunization.

Streptomycin During Convalescence for Tuberculous Meningitis

Q.—*A baby of 11 months is recovering from tuberculous meningitis. She was on streptomycin ½ g. daily for six weeks, isoniazid 100 mg. intramuscularly for 10 days, and thereafter 150 mg. daily, and "decadron" 5 mg. daily, gradually withdrawn in six weeks. Now she is having streptomycin ½ g. twice a week and isoniazid 150 mg. daily. In view of conflicting opinions about streptomycin, could you tell me: (1) whether streptomycin should be dropped or continued, and, if so, for how long; (2) for how long should isoniazid be continued?*

A.—Streptomycin twice a week with daily isoniazid is not always adequate to prevent the emergence of resistant organisms in pulmonary tuberculosis, but resistance emerges less readily in tuberculous meningitis, and if the child is making good progress the risk must be comparatively slight. For a child it is often better, when the child is convalescent, to combine the isoniazid with sodium P.A.S. in a daily dosage of 300 mg./kilo given in two doses. At this stage the dose of isoniazid could be reduced to 5 mg./kilo, which is probably a lower dose than the child is receiving. If this were initiated the streptomycin could be stopped. One year's treatment is adequate if the child is making good progress and is convalescent, but it is essential that the treatment should be absolutely scrupulous and all drugs should be taken as prescribed.

Two Lovely Black Eyes

Q.—*What is the drug used by boxers which reduces bleeding and hastens healing? Is it of any value in clinical medicine?*

A.—The drug used is "varidase" in the form of buccal tablets. These tablets are placed in the buccal sulcus and allowed to dissolve slowly. The usual dose is one four times a day for a minimum of three days. Each tablet contains 10,000 units of streptokinase and approximately 2,500 units of streptodornase. Only the streptokinase is active when administered buccally.

It is stated that this enzyme acts specifically on plasminogen to form plasmin. Thus varidase buccal may indirectly cause dissolution of blood clots and fibrin, and may reduce oedema. Presumably, if further tests show that this preparation is an effective prophylactic measure against bruising, haematoma formation, and some of the other complications of injury, it could be used in other situations than boxing where trauma was expected.

Climate of Auckland

Q.—*Is the climate of Auckland, New Zealand, likely adversely to affect emphysema and chronic bronchitis in a man of 68?*

A.—An elderly sufferer from chronic bronchitis and emphysema is influenced in his choice of climate by the range of mean temperature. To ensure an ideal climate would necessitate considerable travelling as the seasons change. As a permanent residence, Auckland, New Zealand, can be confidently recommended. The mean temperature ranges between 52° F. (11° C.) and 66° F. (19° C.); there is abundant sunshine; and, although in the North Island the number of rainy days is fairly considerable, the total rainfall is moderate. The opportunities for exercise suitable for a person of this type are satisfactory. It may be added that the death rate is conspicuously low.

Collected Articles from the "British Medical Journal"

The following books are available through booksellers or from the Publishing Manager, B.M.A. House. Prices, which include postage, are now the same for both inland and overseas.

Refresher Course for General Practitioners, Volume 3 (26s. 9d.).
Clinical Pathology in General Practice (22s. 3d.).
Any Questions?, Volume 3 (8s. 3d.).

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 4499. TELEGRAMS: *Aitiology, Westcent, London.* ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

Authors desiring REPRINTS should communicate with the Publishing Manager, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors overseas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

ADVERTISEMENTS should be addressed to the Advertisement Director, B.M.A. House, Tavistock Square, London, W.C.1 (hours 9 a.m. to 5 p.m.). TELEPHONE: EUSTON 4499. TELEGRAMS: *Britmedads, Westcent, London.*

MEMBERS' SUBSCRIPTIONS should be sent to the SECRETARY of the Association. TELEPHONE: EUSTON 4499. TELEGRAMS: *Meditecra, Westcent, London.*

B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.